COMPARATIVE TEST
OF
CENTRIFUGAL PRESSURE BLOWERS

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of
CENTRIFUGAL PRESSURE BLOWERS

A THESIS

PRESENTED BY

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&
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PREFACE.

The subject of Centrifugal Pressure Blowers has herein been presented in two parts:- the first, a brief treatise on the general principles and important factors; and the second, a thorough investigation of the performance of blowers in practice.

In Part #1 are given the theory general formulae and important factors which enter into the problem of a proper blower installation.

In Part #2 are given the results, and conclusions to be drawn therefrom, of complete efficiency tests of blowers of the same general type but made by different manufacturers.

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PART -- ONE.

COMPARATIVE TEST OF CENTRIFUGAL PRESSURE BLOWERS.

The following work was undertaken to determine, by comparative tests, the most efficient of three centrifugal pressure blowers of the same type, made by different manufacturers.

The blowers will be compared, first with respect to mechanical efficiency; second, capacity; third, pressure; and fourth, horse power required to drive.

Before the beginning of the actual experiments with the separate blowers, it is proposed to deal with the general theory and deductions therefrom of all centrifugal pressure blowers without regard to their different designs.

The first satisfactory theory of centrifugal blowers in general was promulgated by Daniel Murge. He proved, in a manner which will be explained in the following pages, that theoretically the maximum pressure created by a perfect blower is equivalent to twice the head which would produce a velocity equivalent to that of the periphery.

From the construction of the fan wheel, as shown in figure No. 1, it can be seen that the air

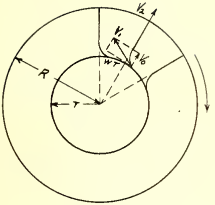


FIGURE #1

is taken in at the center. The vanes begin at the circumference of this inner chamber and are inclined to enable them to receive the air without shock.

Since the air to be used in the blowers is practically motionless, it is necessary to impart to it a velocity, at the expense of the available pressure head, in bringing it to the interior part of the vanes. This velocity will be represented by Vo, and the loss of head occasioned by it will be,

$$- \frac{V_o^2}{2g} \text{ - - - - - - - - - - - - - - - - - - } (1)$$

The centrifugal force of the fan wheel tends to draw the air out through the vanes radially, but this tendency is counteracted by the angular velocity at the circumference of the entrance chamber. The two velocities Vo and w r combine to give a resultant velocity V_1 . The interval between two consecutive vanes forms a narrow passage way, that is, narrow as compared with the area between the vanes

proper. This increase in area reduces the velocity of the air, and it leaves the vanes with a less velocity than it had when it entered. Let this velocity be V_2.

Then by the theory of Bernoulli which says that:- when the speed of a vein of air gradually diminishes from one point to another the increase of pressure is equal to the diminution of the generative heat of the speed. Therefore the gain of pressure in this passage will be given by,

$$+\frac{V_1^2}{2g}-\frac{V_2^2}{2g} \text{---------------} (2)$$

Since the speed V_1 was obtained by combining the tangential speed w r and the radial speed V_0, forming a right angle trangle, the expressions $\frac{V_1^2}{2g}$ may be replaced by the quantity $\frac{V_0^2+w^2r^2}{2g}$ and give the gain of head in the passage the form of

$$+\frac{V_0^2+w^2r^2}{2g}-\frac{V_2^2}{2g} \text{--------------} (3)$$

The movement of the air which is being drawn in, creates the centrifugal force, which in its turn produces a gradual increase in pressure from the interior to the exterior circumference. It is then necessary to imagine a prismatic element of air drawn in, placed at a distance x from the center

and presenting a height dx in the direction of the radius, a base s in the perpendicular direction, and a density σ, the mass in this element will be

$$\frac{s\,d\,x\sigma}{g}$$

and the centrifugal force developed by rotation

$$d\,F = \frac{s\,d\,x\,\sigma}{g}\,w^2x \text{ ------------ } (4)$$

The increase in head per unit of surface from one base to the other of this little prism will be obtained by dividing the preceding expression by s. Then in order to arrive at the differential increase of pressure due to the centrifugal force we must divide by the density σ, which gives,

$$d\,h = \frac{w^2x\,dx}{g} \text{ -------------- } (5)$$

and integrating between the limits $x = r$ and $x = R$, we shall have for the difference in pressure due to centrifugal force, the expression,

$$+\frac{w^2R^2 - w^2r^2}{2g}$$

Then by adding the various pressure heads we obtain,

$$-\frac{V_0^2}{2g} + \frac{V_0^2 + w^2r^2}{2g} - \frac{V_2^2}{2g} + \frac{w^2R^2 - w^2r^2}{2g} = \frac{w^2R^2}{2g} - \frac{V_2^2}{2g} \text{ --- } (6)$$

Thus it is found that irrespective of the shape

given to the vanes, the maximum available head is,

$$H = \frac{u^2}{2g} + \frac{V_2^2}{2g} \text{ -------------- } (7)$$

u being used to designate the velocity of the periphery.

The foregoing shows a complete analysis of the possible pressure heads to be obtained by revolving the fan wheel.

If, as in the case of all pressure blowers, we enclose the fan wheel in a steel cover and permit the air to escape through a passage, as shown in Figure #2, the pressure will be still further increased in the following way: The air will be made to traverse a suitable duct, and it is in the change of velocity between the time of leaving the vanes, and emerging from the duct, that the pressure head is affected. Let V be the speed of the air leaving the vanes and W represent the speed leaving the duct. Then the corresponding increase impression becomes,

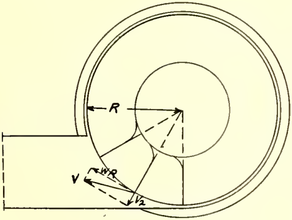


FIGURE #2

$$+\frac{V^2}{2g}-\frac{W^2}{2g}$$

The speed V is obtained by combining the tangential speed u and the relative velocity of the air leaving the vanes, which was shown to be V_2. The resultant, is given by the trigonometrical relation between the angles and sides of a triangle, and is as follows:

$$V^2 = u^2 + V_2^2 - 2\ u\ V_2\ \cos a \text{ ---------- } (8)$$

in which a is the angle at which the vanes strike the exterior circumference. In substituting this value of V^2 in the preceding expression we shall have,

$$+\frac{u^2}{2g}+\frac{V_2^2}{2g}-\frac{2u\ V_2\ \cos a}{2g}-\frac{W^2}{2g}$$

which, when added to that already obtained with the separate fan wheel, will give the total head,

$$H = \frac{u^2}{g} - \frac{u\ V_2\ \cos a}{g} - \frac{W^2}{g} \text{ ------- } (9)$$

By the inspection of the preceding equation, it can be seen that if $a = 90°$ the term $\frac{u\ V_2\ \cos a}{g}$ will be made equal to zero and drop out. On the other hand if a is made greater than 90° the term will become a positive quantity. This has been tried by experimenters, and the results obtained have not been

as good as those with the angle equal to 90°. This fact has been accounted for by a loss of head in the expression No. 2.

$$+\frac{V_1^2}{2g}-\frac{V_2^2}{2g}$$

The area between the vanes does not increase as it would with $a=90^\circ$, and the negative term $-\frac{V_2^2}{2g}$ increases, which weakens the head, causing the machine to lose its power.

The equation for available pressure head is then reduced to,

$$H=\frac{u^2}{g}-\frac{W^2}{2g}\text{ ------------- }(10)$$

It now remains to proportion the air duct, so that the exit velocity is practically zero, which is about the same as having the blower working on a closed space, with respect to velocity, and the term $-\frac{W^2}{2g}$ will then become zero leaving

$$H=\frac{u^2}{g}\text{ -------------------- }(11)$$

In theory, as has been shown, the pressure to be obtained from a pressure blower depends upon the velocity of the periphery, and should remain constand at a value equal to that which it reaches when acting upon a closed space. In reality the head obtained is always less than its initial head.

A great part of this head will be found to be absorbed by the frictions and losses of active power in air traversing the machine.

IMPORTANT FACTORS.

In the conveying of the air from the blower it has been found by experiment that the volume and head of air handled depend upon two factors. These factors are:- first, equivalent orifice; and second, orifice of passage.

The determination of these two factors is made possible by the use of the formula for gravity, $h=\frac{v^2}{2g}$, where v = Vel. Ft. per sec. g = accel. of gravity, and h = press. head in feet of air, which gives the height of fall, or height of column of the flowing air.

EQUIVALENT ORIFICE.

It has been determined by actual experiment that the quantity of air which passes through an orifice in a thin plate is equal to .65 that of the quantity due to the area of the full orifice and since

$$h=\frac{v^2}{2g}$$

and $$V=\sqrt{2gh}$$

$$Q=.65\ a\sqrt{2gh}$$

Where Q = quantity in cu. ft. per sec. and a = area of equivalent orifice in sq. ft.

Reducing equa. 1 we obtain a formula for the equivalent orifice.

$$a = \frac{V}{.65\sqrt{2\ g\ h}} = \frac{V}{.65\sqrt{2\ g\ h\frac{\sigma_o}{\sigma}}}$$

where $\sigma_o = 1000$ and $\sigma = 1.2$, or the relative densities of water and air. Then by substituting the value $2\ g = 64.4$ we have,

$$a = \frac{V}{43.50\sqrt{h}} = \frac{.02296V}{\sqrt{h}}$$

In this case $V =$ cu. ft. per sec. $h =$ inches water. The performance of a blower is generally spoken of in cu. ft. per min. and by treating the above densities as normal we have,

$$a = \frac{.0003825\ Q}{\sqrt{h}}$$

where $Q =$ cu. ft. per min. $h =$ inches water.

The value of the foregoing lies in the fact that it enables us to grasp at once the conditions under which a blower is working.

ORIFICE OF PASSAGE.

The "Orifice of Passage" is a collective term which is used to represent the various resistances in a blower and air duct. This Orifice of Passage forms an obstacle to the passage of air and causes a sensible loss of duty, thereby decreasing the

head.

The head which is obtained when a blower is acting upon a closed space is called the initial head. The Orifice of Passage is associated with the Equivalent Orifice, because of the fact that as the Equivalent Orifice increases the initial head gradually decreases. The gradual decrease is accounted for in the Orifice of Passage.

Calling H the initial head, ho the gradual reduction, and h the effective head, we will have,

$$h = H - ho$$

The relation between the Equivalent Orifice and the Orifice of Passage is given in the following:

Let a represent area of Equivalent Orifice in sq. ft.

Let O represent area of Orifice of Passage in sq. ft.

Then having given the heads,as given above, and knowing that the same volume of air traverses each orifice we have,

$$V = .65\ a \sqrt{2gh}$$

and

$$V = .65\ O \sqrt{2gho}$$

$$\frac{ho}{h} = \frac{a^2}{O^2} \quad \text{or} \quad O = a \sqrt{\frac{h}{ho}}$$

Then by assuming the same normal densities as given

in the equivalent orifice discussion we have,

$$O = a\sqrt{\frac{h}{ho}}$$

in which the areas are in sq. ft. and the heads in inches of water

The head produced by any pressure blower is divided into two distinct quantities, velocity head and static head. The total head produced is called the dynamic head, and is equal to the sum of the velocity and static heads. This condition of affairs is especially true of air ducts of small diameters. In the preceding paragraphs the term head has meant the dynamic head.

In air ducts of large diameters the velocity head is very small and in some cases negligible.

In theory the sum of the static and velocity heads should be equal to a constant dynamic head, but, as will be shown in the experimental results following, such is not the case in practice.

When designing blowers it is the usual practice of prominent manufacturers to vary the peripheral speed in obtaining the desired pressure.

The volume requirements are a direct function of the width of the blades.

The pressure may be secured by running a small wheel at high speed or a large wheel at low speed. If however the diameter of the wheel is made too small it may be impossible to adapt a width of blade, within reasonable limits, which will permit the necessary volume of air and pressure transformation within the blades, to give the desired pressure.

Pressure and volume in a fan, above certain limits for each type, are obtained only at the expense of the horse power required to drive it, and so it is apparent that the builders of blowers must use a different design for each installation in order to have the best economy.

PART--TWO.

In Part One all discussions and theory was general and applies to all the blowers alike; Part Two will therefore be specific, taking each blower in turn, giving manner of testing, results therefrom, and finally a general comparative discussion upon the advantages and disadvantages of the different makes.

A good idea of the apparatus and the general arrangement of the same may be obtained from the drawing on print (A). The apparatus consists of a motor-driven blower placed at one end of a 15 foot fiber duct,10 inches in diameter, into which it discharges, and at the other end of which is a slot into which orifices of different diameters may be placed.

A set of Pitot tubes was used in measuring the pressure heads in the duct. The data obtained by the use of the Pitot tubes forms an extremely vital part in the experiments to follow, and it is very important that they be used correctly.

The construction of the tubes used is shown on print (B).

Many exhaustive experiments have been carried on to determine the equation of the Pitot tube, and

the effect of changing the shape of both the dynamic and static tubes.

The pressure chamber or static tube of this particular design has been so proportioned as to give an efflux coeff. of unity in the equation, $V = K\sqrt{2gh}$, where V = Vel. in ft. per sec. K = coeff., g = accel. of gravity and h = vel. head in ft. of air.

It has been shown, by numerous experimentors, that the shape of the dynamic tube does not effect the readings given by it in any way.

A method of roughly testing the tubes is given in the placing of the tip just outside the mouth of an air duct. At this point it is apparent that there is no static head, the velocity of the air only exerting a pressure, and therefore the tubes show no static pressure.

It is important that the tip of the tube be placed at the point in the duct, where the passing air has its mean velocity, and this point is called the mean radius.

The mean radius of the duct was found by measuring the velocity heads at different places along the diameter and plotting a curve as shown in print (C).

The mean radius data and results are shown on print (D).

The area under this curve was integrated by means of a planimeter, and by dividing by one-half of the base, the altitude of the mean triangle was obtained.

At the point where the hypothenuse of this triangle cuts the curve a perpendicular was dropped intersecting the base. The point of intersection between the perpendicular and the base gives the mean radius.

The type of Pitot tube used by us was very carefully calibrated by R. Burnham, and a complete discussion of his investigations is given in the "Engineering News", December 21" 1905, under the title of "THE Pitot Tube". A discussion of the method of determining the mean radius is also given in the same article.

This calibration work shows very conclusively that, for this form of instrument, the coefficient of efflux is unity.

The pitot tube is inserted into the duct about

two feet from the end, as shown, and is connected by flexible rubber tubing to the draft gauge which measures the velocity head and to the manometer, which measures the static head.

The draft gauge used is of standard type and having been calibrated from time to time in the mechanical labratories of the Armour Institute, is assumed to be correct. It is graduated to read to a thousandth of an inch.

The manometer is of the ordinary U-tube type being filled with destilled water which is assumed to be at 62 F. This manometer was graduated to read to a hundredth of an inch.

The thermometer shown near the pitot tube is inserted into the duct, and the temperature of the air therein obtained from it. The input of the motor is determined from reading of an ammeter and voltmeter, not shown on the print, connected in the usual manner in the circuit. A tachometer was used in obtaining the blower and motor speeds.

CALIBRATION OF APPARATUS.

MOTOR.

The motor used in these tests was No. 553976 inter pole motor manufactured by the Electric Dynamic Company of Bayonne, N. J., and develops 5-H. P. at 40 amperes with voltage at 110, and has a speed variation from 290 to 1160 R. P. M.

The calibration of this motor consisted of a series of six runs in each of which the speed was kept constant, or approximately so, and the load varied.

The ordinary apparatus was used consisting of a prony brake, scales and tachometer, from which the motor output was determined, the input being determined from the readings of a voltmeter and ammeter connected in the circuit. The data obtained as well as the results calculated therefrom are shown on log sheet, print (E). The curves shown on print (F) are the efficiency calibration curves plotted from these results, and the curve on print (G) is an average of these curves.

In using these curves to obtain the motor efficiency for varying input values, the curve corres-

ponding to the motor speed, at time of input reading, was used.

AMMETER AND VOLTMETER.

The meters used in these tests were of the Weston direct reading type, manufactured by the Weston Electrical Instrument Company of Newark, N. J. The voltmeter was model 1, No. 17340, and had two scales 0-2.5 and 0-120. The ammeter was model 1, No. 8933, and read from 0 to 120 amperes.

These instruments were calibrated by comparison with standard instruments and found to be very nearly correct. The error was so small, that it would be negligible in our calculations; therefore we assumed the voltmeter and ammeter readings to be correct.

SCALES.

The scales used in connection with the prony brake were calibrated by placing standard weights upon them, and they were found to be correct within their limits of measuring.

THERMOMETERS.

The thermometers used in measuring the temper-

ature of the room and of the air in the duct were the ordinary type, graduated in degrees and were assumed to be correct within the range of accuracy required in these tests.

TACHOMETERS.

A direct reading tachometer was used to obtain the speed of the blower and motor pulleys.

By shifting a small clutch, we were able to use the tachometer to measure speed on four different scales. The scales in R. P. M. were 30 to 120, 100 to 400, 300 to 1200 and 1000 to 4000.

Our speed measurement requirements were fulfilled by the 300 to 1200 and 1000 to 4000 scales, so these were calibrated.

The tachometer was calibrated by the aid of a frequency meter, which recorded the frequency of an alternating current. The frequency and speed of shaft were taken simultaenously, with the meter and tachometer respectively.

Then calculating the R. P. M. by the frequency formula, $R.P.M = 60fp$, we were enabled to compare the tachometer readings with the corresponding correct

ones. From this data calibration curves were plotted and used throughout the experimental work.

The curves are shown on prints (H) and (I).

BUFFALO BLOWER.

SIZE NO. 9

The Buffalo Blower was installed as shown on print (A) and a series of four runs was made upon it as follows:-

1. Constant high speed at approximately 1500 R. P. M., and discharge orifice diameter varying from 0 to 10 inches.
2. Constant low speed at approximately 1075 R. P. M., and discharge orifice diameter varying from 0 to 10 inches.
3. Constant discharge orifice at 10 inches in diameter or .5459 sq. ft. in area, and speed varying from 596 to 1485 R. P. M.
4. Constant discharge orifice at 8" in diameter or .3490 sq. ft. in area, and speed varying from 600 to 1535 R. P. M.

The apparatus was first put in good running order and the zero of the draft gauge was determined, after which the motor was started. The speed was gradually raised until the required speed was reached, and the 0 orifice plate was then inserted in the slot. After the blower had been running for a few

minutes, in order that conditions might become constant, the run was started and the following readings were taken:-

1. Draft gauge or velocity head.
2. Manometer or static head.
3. Ammeter.
4. Voltmeter.
5. Temperature in duct.
6. Temperature in room.
7. R. P. M. of blower.
8. R. P. M. of motor.

The blank plate was then removed and the 3" orifice inserted in its place, and again the conditions were allowed to become constant, after which the above operations were repeated. These operations were repeated for the 4", 5", 6", 7", 8", and 10" orifices, after which they were again repeated taking the orifices in the opposite order, namely 10", 8", 7", 6", 5", 4", 3" and 0".

Run 1 was exactly like Run 2, except that the speed was kept constant at approximately 1075 R. P. M. instead of 1500 R. P. M.

After Run 2 the motor was stopped and the apparatus allowed to lie idle a short time, after which the draft gauge zero was again determined and the Run 3 was started. The blower was brought up to a speed of 596 R. P. M. and after conditions were constant, readings similar to those in Run 1 were taken. The speed was then raised in increments of about 100 R. P. M., making 8 steps up to 1485 R. P. M. and readings of the different instruments taken for each increment.

Run 4 was exactly the same as Run 3, except that the discharge orifice was 8" in diameter instead of 10".

The data obtained from these tests are shown on prints (J)(K)(L)&(M) and the results calculated from it as well as the corrected readings on prints (N)(O)(P)& (Q).

The curves plotted therefrom appear on prints (R) (S)(T)&(U).

AMERICAN BLOWER.

TYPE V. NO.5

In the installation of the Buffalo Blower the blower outlet fitted very snugly into the discharge duct; in the case of the American Blower, however the outlet was two large and a reducer had to be fitted in order to make a good connection.

The tests upon the American Blower were the same as those made upon the Buffalo Blower, except that three readings were made in each run upon similar conditions instead of two, as before.

The results obtained in the runs are tabulated in the running logs, on prints (V)(W)(X)(Y), and the results of the calculations made from them are shown on prints (Z)(AA)(BB)&(CC). The curves plotted from these results are shown on prints (DD)(EE)(FF) &(GG).

SAMPLE CALCULATIONS.

The following presents a complete set of sample calculations, blue print result of which are given in the American Blower log sheet print (CC).

The data are shown on print (Y) and the test curves appear on print (GG).

As shown on the data sheet three complete sets of readings were taken for each blower speed. The average values of the three sets were obtained and used in the computation.

RESULTS FOR RUN NO. 1.

Barometer reading, inches Hg. -------------29.74

Zero draft gauge reading, inches H_2O ------- .330

Diam. Disch. orifice, inches -------------- 8

Area disch. orifice, sq. ft.=(8X8)÷(144X4) = .349

The draft gauge reading gave the static head, inches H_2O ------------------------------ .108

The manometer reading gave the static head, inches H_2O ------------------------------ .43

The sum of the velocity and static heads gave the dynamic head -- (.108+ .43) ----------- .538

VALUE OF AIR CONSTANT.

The formula, $H = \frac{29.92}{P} \times \frac{T}{523} \times 68.44$, was used to obtain the height of a column of air in feet, equivalent to an inch of water for each run. The water in manometer was assumed to be at 62°F. In the formula,

H = ft. of air equal to 1 inch of water.

P = Barometer + static head, ins. of Hg.

T = absolute temperature in duct °F.

Therefore, $H = \frac{29.92}{29.77} \times \frac{527.3}{523.0} \times 68.44 = 69.29$ ft. of air.

PRESSURES IN FT. OF AIR.

Velocity head in ft. of air = $(.108 \times 69.29) = 7.49$

Static head in ft. of air = $(.43 \times 69.29) = 29.80$

Dynamic head in ft. of air = $(.538 \times 69.29) = 37.29$.

OUNCES OF PRESSURE PER SQ. IN.

The dynamic pressure in inches of water was reduced to ounces per sq. in.

$$.538 \times .0361 \times 16 = .311.$$

MEAN VELOCITY IN DUCT.

Since the Pitot tube was placed at the mean radius of the duct, the velocity head recorded gives the mean velocity,

$$v = \sqrt{2gh} = \sqrt{2 \times 32.2 \times .108 \times 69.29} = 21.93 \text{ ft. per sec.}$$

WT. OF CU. FT. OF AIR IN DUCT.

The formula $W = \frac{P}{29.92} \times \frac{461}{T} \times .0864$, was used to obtain the weight of a cu. ft. of air in the duct.

W = wt. of a cu. ft. of air in lbs.

P = barometer + static head, ins. of Hg.

T = absolute temp. of air in duct °F.

Therefore $W = \frac{29.77}{29.92} \times \frac{461.0}{527.3} \times .0864 = .0752$ lbs.

AIR MOVED PER SEC. CU. FT. "

Mean velocity X area duct. $=(21.93 \times .5454) = 11.96$ cu. ft.

AIR MOVED PER SEC. LBS.

$11.96 \times .0752 = .900$ lbs.

WORK DONE IN MOVING AIR FT. LBS.

Wt. of air moved per sec. X dynamic head ft of air., $= .900 \times 37.29 = 33.60$ FT.LBS. per. sec.

WORK DONE IN MOVING AIR H.P.

$33.60 \div 550 = .061$ H.P.

R. P. M. OF MOTOR AND BLOWER.

The values of R. P. M. as given on the log sheet are the average of the values given on the data sheet, and have been corrected with the aid of the tachometer calibration curves. The tachometer curves are shown on prints (H) & (I).

PERIPHERAL VELOCITY OF BLADES FT. PER MIN.

$(3.1416 \times 19 \times 598) \div 12 = 2980$ ft. per min.

WATTS INPUT OF MOTOR.

Volts X amperes $= 114 \times 4.83 = 550.2$ watts.

MOTOR AND BELT EFFICIENCY.

The motor efficiency is obtained by the use

of the efficiency curves shown on print (F), which an out put of 300 watts corresponding to 550.2 watts input, at the speed of 348 R. P. M.

$\text{efficiency} = 300 \div 550.2 = 54.50\%,$

$\text{slip of belt} = \left(\frac{12}{6.875} \times 348\right) - 598 = 607 - 598$

$= 9$ R. P. M.

$\text{slip of belt } \% = 9 \div 607 = 1.48\%$

COMBINED MOTOR & BELT EFFICIENCY.

$54.50\,\% - (54.50 \times 1.48) = 53.69\,\%.$

WORK SUPPLIED TO BLOWER FT. LBS.

$\frac{.5369 \times 550.2}{746} \times 33000 = 13{,}100$ FT. LBS.

WORK SUPPLIED TO BLOWER H. P.

$\frac{.5369 \times 550.2}{746} = .3966$ H. P.

MECHANICAL EFFICIENCY OF BLOWER %

$.061 \div .3966 = 15.38\,\%$

CAPACITY COEFFICIENT.

A statement involving the capacity coefficient is as follows:

The capacity in cu. ft. per min. is equal to the cube of the fan wheel diam. in ft. multiplied by the R. P. M. and a coefficient K.

$$\text{Cu. ft. per min.} = \left(\frac{D}{12}\right)^3 \times \text{R. P. M.} \times \text{K.}$$

Therefore $K = \dfrac{\text{cu. ft. per min.} \times (12)^3}{(19)^3 \times \text{R. P. M.}} = (11.96 \times 60 \times 1728) \div (6859 \times 598) = .302$

HORSE POWER COEFFICIENT.

A statement involving the horse power coefficient is as follows:

The horse power required to drive the blower is equal to the fifth power of the diam. of the fan wheel in ft. multiplied by the cube of the R. P. S. and divided by 1,000,000 the quantity being multiplied by a coefficient K.

$$\text{H.P.} = \frac{\left(\frac{D}{12}\right)^5 \times (\text{R.P.S.})^3 \times K}{1,000,000} = \frac{(19)^5 \times (\text{R.P.M.})^3 \times K}{(12)^5 \times (60)^3 \times 1,000,000}$$

$$K = \frac{.3966. \times 1,000,000 \times (12)^5 \times (60)^3}{(19)^5 \times (598)^3}$$

$$K = 40.35$$

SAMPLE OF GENERAL CALCULATION.

RESULTS SHOWN ON PRINT (TT)

The data used in the calculation of these results were obtained from the curve sheets for constant orifice, and represent comparative values.

The following gives the method of calculation of the Buffalo Blower results in NO. 1 with the discharge orifice constant at .5454 sq. ft.

CU. FT. PER MIN.

Cu. ft. per sec. X 60 = 29.28 X 60 = 1757 cu. ft. per min.

CU. FT. PER REVOLUTION.

R. P. M. = 800 ∴ 1757 ÷ 800 = 2.195 cu. ft.

DYNAMIC HEAD, INCHES H_2O

H = .753 -- obtained from curve.

OUNCES PER SQ. IN.

.753 X .0361 X 16 = .435 ounces per sq. in.

THEORETICAL HEAD.

$\frac{U^2}{g} = \left(\frac{DN\pi}{12X60}\right)^2 \div 32.2 = \left(\frac{\pi 22X800}{12X60}\right)^2 \div 32.2 = 183.100$ ft. of air.

Assuming the relative densities of water and air as 1000: 1.200, one foot of air = (12X1.200) ÷

1000 = .0144 inch. water. ∴ 183.100 X .0144 = 2.64 inches of water.

EQUIVALENT ORIFICE.

The equivalent orifice is obtained by using the formula, $a = \frac{.0003825Q}{h}$ where, a = area equivalent orifice in sq. ft.

Q = cu. ft. per min.

h = dynamic head in inches H_2O

Then $a = \frac{.0003825 \times 1757}{\sqrt{.753}}$

$a = \frac{.6725}{.87} = .774$ sq. ft.

ORIFICE OF PASSAGE.

The following shows the method of calculating the orifice of passage for the Buffalo Blower Running at 1490 R. P. M. discharge area .5454 sq. ft.

Formula $o = a\sqrt{\frac{h}{ho}}$

where o = orifice of passage sq. ft.

a = equivalent orifice sq. ft.

h = effective head, inches of water.

ho = reduction of initial head.

a is obtained by taking the average of the

values calculated at speeds of 800, 1000 and 1200 R. P. M.

Therefore $a = .767$ sq. ft.

As will be noticed these calculated values of a agree very closely.

At 1490 R. P. M. the initial head is 4.65 inches of water. This value is obtained from the constant speed variable orifice curves on the Buffalo Blower. Then by referring to the constant orifice (at .5454 sq. ft.) variable speed curves, the value 2.35 inches of water will be obtained as the dynamic head at 1490 R. P. M.

Then 4.65" water = initial head.

2.35" water = effective head.

and 4.65 - 2.35 = 2.30" H_2O reduction of initial head.

We now have the values of the terms given in the equation.

Therefore $o = .767 \sqrt{\frac{2.35}{2.30}} = .805$ sq. ft.

HORSE POWER COEFFICIENTS.

The values of the H. P. coefficient, as shown on the Comparative Blower Results log sheet, are the

average of the results calculated on the separate Blower Test log sheets.

CAPACITY COEFFICIENT.

These values were also obtained from the separate Blower Test log sheets.

With the exception of a few cases the above coefficients were almost constant in value, that is, constant for each orifice.

In computing the H. P. coef. it was found that for speeds below 1000 R. P. M., the values obtained were not constant.

For the higher speeds the values became very nearly constant, and these were used in determining the average value.

THE STURTEVANT BLOWER.

SIZE NO. 7

In the installation of this blower a reducer had to be made and fitted in order to insure a good connection, as was the case in the American Blower.

Again the same tests were made upon this Blower as were made upon the Buffalo and American, this test being an exact repitition of the American Blower test. Some little difficulty was encountered in obtaining and maintaining the high speeds upon this blower and in the end we were only able to obtain two readings instead of three, as in other runs. We also had to change the Pitot Tube connections as the velocity head was too large to be obtained from the draft gauge. The manometer was therefore substituted in the draft gauges' place for reading velocity heads, and the draft gauge was used for determining the static head. We also had to drill through one of the thrust bearings on the blower in order to get the R. P. M. by means of the tachometer. We did this in such a manner as not to interfere with the smooth running of the blower.

The data of these tests are shown on prints (HH)(II)(JJ)(KK), and the results calculated therefrom are shown on prints (LL)(MM)(NN)(OO). The curves plotted from and showing these results are given on prints (PP)(QQ)(RR)(SS).

GENERAL DISCUSSION.

The results of the tests will be compared at the point of the highest mechanical efficiency of each blower, taking into account capacity, Dynamic pressure and H. P. required to drive.

TEST NO. 1

Constant speed, 1490 R. P. M. approx., variable disch. orifice.

The efficiency curve of each blower is given on print (UU). It will be observed that the American Blower shows the highest efficiency, 52%, at a disch. area of approx., .325 sq. ft.requiring 1.53 H.P.

Each of the blowers shows its highest efficiency at this disch. area.

Sturt. 47% Buffalo 34%.H. P. 7.15 & 3.80 Respect.

By referring to the general curve sheet ofeach blower for this test, the following results appear for the disch. area of .325 sq. ft.

	Cu. ft. per sec.	H. P.	Dynamic head inch H_2O
Sturtevant	42	7.15	7.70
Buffalo	31	3.8	4.55
American	28	1.53	3.55

The Sturtevant and American Blowers show marked superiority in different fields: the Sturtevant in capacity and pressure, while the American requires very little horse power to drive it, and leads in efficiency.

The Buffalo has an advantage over the American in capacity and pressure, but lacks 18% of being as efficient and requires more than twice as much horse power to drive.

Between the Sturtevant and American Blowers it is a matter of requirements as to which is the better, but either has a decided advantage over the Buffalo according to this test.

TEST NO. 2

Constant speed 1090 R. P. M. approx., variable disch. orifice. The efficiency curve of each blower is given on print (VV). It will be observed that the Sturtevant Blower shows the highest efficiency, 58.50%, at a disch. area of approx., .325 sq. ft., requiring 2.64 H. P.

Each of the blowers shows its highest efficiency at this disch. area.

American 48%, Buffalo 34% requiring .72 &.140 H. P. Respect.

By referring to the general curve sheet of each blower the following results appear, for the disch. area of .325 sq. ft.

	cu.ft. per sec.	H.P.	dynamic press. inch H_2O
Sturt.	33.5	2.64	4.83
Buffalo.	22.5	1.4	2.35
Amer.	20.0	.72	1.75

In this test the results shown by the Sturtevant Blower are much better than those by either the American or Buffalo Blowers.

As in the preceding test the Buffalo shows better that the American in cap. and pressure, but falls behind in mechanical efficiency, the American Blower advantage being 14%.

The Sturtevant is still rather high in horse power requirements, but has increased in efficiency, and its capacity and pressure qualities seem to place it before the others.

TEST NO. 3

Constant Orifice, 5454 sq. ft., variable speed.

The efficiency curve for each blower is given

on print (WW).

The Sturtevant Blower shows its highest efficiency at 1000 R. P. M., 42.50%, requiring 3.1 H. P.

The American Blower shows its highest efficiency at 1300 R. P. M., 3050%, requiring 1.75 H. P.

The Buffalo Blower shows its highest efficiency at 1100 R. P. M., 27.00%, requiring 2.5 H. P.

By referring to the general curve sheet of each blower the following results appear at highest M. E. points.

	cu.ft. per sec.	Dynam. press.	H.P. to drive.
Sturt.	56	2.6	3.1
Amer.	42	1.4	1.75
Buffalo.	40	1.4	2.5

The only question between the Sturtevant and American Blowers is in the horse power required to drive, the other points being in favor of the Sturtevant.

The results of the Buffalo Blower do not compare at all favorably with the other two.

The American is first in H. P. required to

drive, the Sturtevant leads in the other items, while the Buffalo stands out only in pressure.

TEST NO. 4

Constant Orifice .349 sq. ft., variable speed.

The efficiency curve for each blower is given on print (XX).

The Sturtevant Blower shows its highest efficiency at 1000 R. P. M., 57%, requiring 2.00 H. P.

The American Blower shows its highest efficiency at 1200 R. P. M., 54%, requiring 1.00.

The Buffalo Blower shows its highest efficiency at 1200, 36%, requiring 2,10.

By referring to the general curve sheet of each blower the following results appear at the highest M. E. points.

	ft. per sec.	Dynamic	H. P.
Sturt.	32	3.65	2.00
Buffalo.	27	2.85	2.10
Amer.	24	2.15	1.00

The Sturtevant is again first in every way except horse power, but this time its advantage in efficiency over the American Blower is only 3% and it requires twice the driving horse power.

The Buffalo exceeds the American in cap. and pressure, but is so far behind in efficiency to drive, that it offsets the advantage.

CONCLUSIONS.

The Sturtevant Blower is a very efficient machine when running at about 1000 R. P. M., and discharging through a constant orifice of 8 or 10 in. diameter. The efficiency decreases rapidly as the speed is raised, while discharging through a 10 in. orifice, but remains practically constant, from 1000 to 1500 R. P. M., when the 8 in. disch. orifice is used.

In the variable discharge area and constant speed test the Sturtevant Blower performed most efficiently with a disch. orifice of about 8 in. in diameter at a speed of 1100 R. P. M.

The American Blower stands out almost as well as the Sturtevant so far as efficiency is concerned,

and is far in the lead considering horse power to drive, but is deficient in comparison with the others as to capacity and pressure.

Its best performance with constant disch. orifices and variable speeds, was with the 8 in. orifice at 1200 R. P. M.

The high speeds do not affect its efficiency nearly as much as was observed in the case of the Sturtevant.

In the variable discharge area and constant speed test, the best results obtained were with the same disch. orifice as with the Sturtevant Blower but at 1490 R. P. M.

The Buffalo Blower is not up to the standard of the other blowers and only compares with the American, only in capacity and pressure, at a decided loss in horse power and efficiency.

The best results obtained from the constant discharge experiments were with the 8" orifice at 1200 R. P. M.

When it was discharging at constant speed the

results were the same at speeds of 1100 and 1500 R. P. M. the disch. orifice diameter remaining constand at 8".

The marked superiority of the Sturtevant Blower in the matter of capacity and pressure is undoubtedly due to the fact that the Sturtevant fan wheel diameter is much greater than those of the other two. Also the Sturtevant has six large vanes with three intermediate small ones, while the American and Buffalo have six and five large ones respectively.

The difference in capacity and pressure between the Buffalo and American is due to the fact that the Buffalo fan wheel diam. is 3 in. greater than that of the American.

DISCUSSION OF COMPARATIVE BLOWER LOG SHEET RESULTS.

This log sheet appears on print (TT) and shows the action of the blowers under similar conditions.

B represents the Buffalo Blower.

A represents the American Blower.

S represents the Sturtevant Blower.

In capacity it can be seen that S, B, & A rank first, second and third, also in dynamic pressure the same is true.

These differences can be laid almost directly to the fan wheel diameter.

It is interesting to note the fact that by dividing the dynamic head by $\frac{U^2}{g}$, which gives the manometric efficiency, the resulting value is almost a constant for each orifice. The average manometric efficiency for all three blowers is 28% at .5454 sq. ft. discharge, and 46% at .349 sq. ft. discharge.

The equivalent orifice is shown to be practically constant for each blower at different speeds providing the discharge orifice remains con-

stant.

The equivalent orifice represents the area necessary to discharge a given volume of air, without friction, in the passage of same.

The orifice of passage represents the amount of area which is taken up in the friction of the air passing through a duct.

The horse power coefficient is valuable in that, if the diam. of fan wheel and R. P. M., desired are known, the H. P. required to drive can be calculated.

The capacity coeff. is also valuable because, with its aid, the cu. ft. per min. to be expected from a blower can be calculated when the desired fan wheel diam. and R. P. M. are known.

LIST OF CONSTANTS DETERMINED IN EXPERIMENTS AND CALCULATIONS.

BUFFALO BLOWER.

SIZE NO. 9

$h = .000004125\ N^2$ h = ins. of water N = R.P.M.

PERIPHERAL VELOCITY.

$V = 5.76\ N$ V = FT. per min. N = R.P.M.

CAPACITY COEFFICIENT.

For 2" or 8" disch. orifice.

$Q = 1.3175 \times$ R.P.M. Q = cu. ft. per min.

For 10" disch. orifice.

$Q = 2.245 \times$ R.P.M.

HORSE POWER COEFFICIENT.

For 8" Disch. orifice.

$H.P. = .000000001207\ (R.P.M.)^3$

For 10" disch. orifice.

$H.P. = .00000000201\ (R.P.M.)^3$

AMERICAN BLOWER.

TYPE V. NO. 5

THEORETICAL HEAD.

$h = .000003075\ N^2$ h = inches water N = R.P.M.

PERIPHERAL VELOCITY.

$V = 4.98\ N$ V = FT. per min. N. = R.P.M.

CAPACITY COEFFICIENT.

8" orifice.

$Q = 1.106$ R.P.M. Q = cu. ft. per min.

10" orifice.

$Q = 1.883$ R.P.M.

HORSE POWER COEFFICIENT.

8" orifice.

$H.P. = .000,000,000,549 \ (R.P.M.)^3$

10" orifice.

$H.P. = .0000000007961 \ (R.P.M.)^3$

STURTEVANT BLOWER.

SIZE NO. 7

THEORETICAL HEAD.

$h = .0000082 \ N^2$ h = inches water N = R.P.M.

PERIPHERAL VELOCITY.

$V = 8.12 \ N$ V = ft. per min. N = R.P.M.

CAPACITY COEFFICIENT.

8" orifice.

$Q = 1.932$ R.P.M. Q = cu. ft. per min.

10" orifice.

$Q = 3.346$ R.P.M.

HORSE POWER COEFFICIENT.

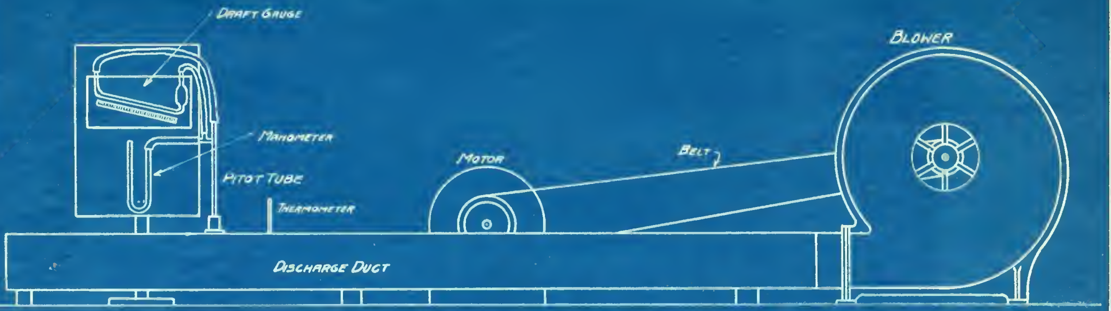
8" orifice.

H.P. $= .000000002221\ (\text{R.P.M.})^3$

10" orifice.

H.P. $= .000000003495\ (\text{R.P.M.})^3$

W. E. Holmes.
W. F. Conlin



GENERAL LAYOUT OF APPARATUS

BLUE PRINT 1A

CONNECTIONS BETWEEN
PITOT TUBE & MANOMETERS

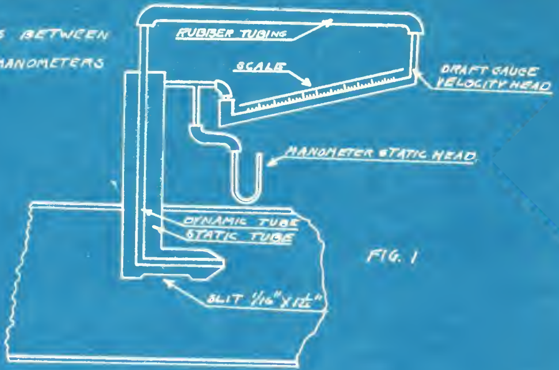


FIG. 1

B

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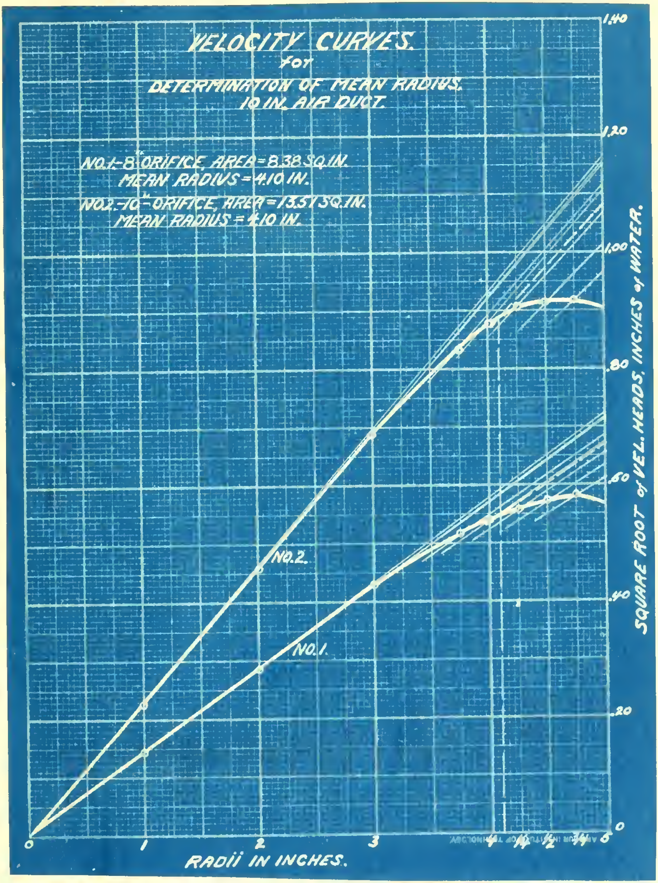
[illegible] TECHNOLOGY
[illegible]


VELOCITY CURVES.
for
DETERMINATION OF MEAN RADIUS.
10 IN. AIR DUCT.
NO.1.-8" ORIFICE, AREA=8.38 SQ.IN.
MEAN RADIUS=4.10 IN.
NO.2.-10" ORIFICE, AREA=13.57 SQ.IN.
MEAN RADIUS=4.10 IN.
NO.2.
NO.1.
1.40
1.20
1.00
.80
.60
.40
.20
0
SQUARE ROOT of VEL. HEADS, INCHES of WATER.
0
1
2
3
4
1/4
1/2
3/4
5
RADII IN INCHES.

C

MEAN RADIUS DATA

10 INCH ORIFICE

TEMPERATURE 74.7°F

MANOMETER READING = 0

DISTANCE FROM CENTER	DRAFT GAUGE READINGS					√VEL. HEAD
	1	2	3	4	AVERAGE	
0"	1.350	1.330	1.360	———	1.350	1.162
1.0"	1.325	1.325	1.325	1.360	1.330	1.152
2.0"	1.325	1.325	1.320	1.320	1.322	1.153
3.0"	1.320	1.315	1.320	1.320	1.320	1.150
3.75"	1.190	1.200	1.250	1.260	1.220	1.104
4.0"	1.150	1.150	1.150	1.190	1.170	1.082
4.25"	1.100	1.120	1.170	1.170	1.140	1.068
4.50"	1.025	1.025	1.025	1.025	1.025	1.012
4.75"	0.920	0.950	———	———	0.935	0.967

8" ORIFICE

TEMPERATURE 75°F

MANOMETER READING 1.5" H_2O

0"	.530	.520	.530	———	.527	.725
1.0"	.510	.510	.525	.525	.517	.719
2.0"	.500	.500	.520	.520	.510	.715
3.0"	.490	.500	.510	.528	.507	.712
3.75"	.450	.450	.480	.480	.465	.683
4.0"	.440	.440	.460	.470	.452	.673
4.25"	.420	.420	.440	.440	.430	.656
4.50"	.390	.400	.415	.415	.405	.636
4.75"	.370	.380	———	———	.375	.612

6 INCH ORIFICE

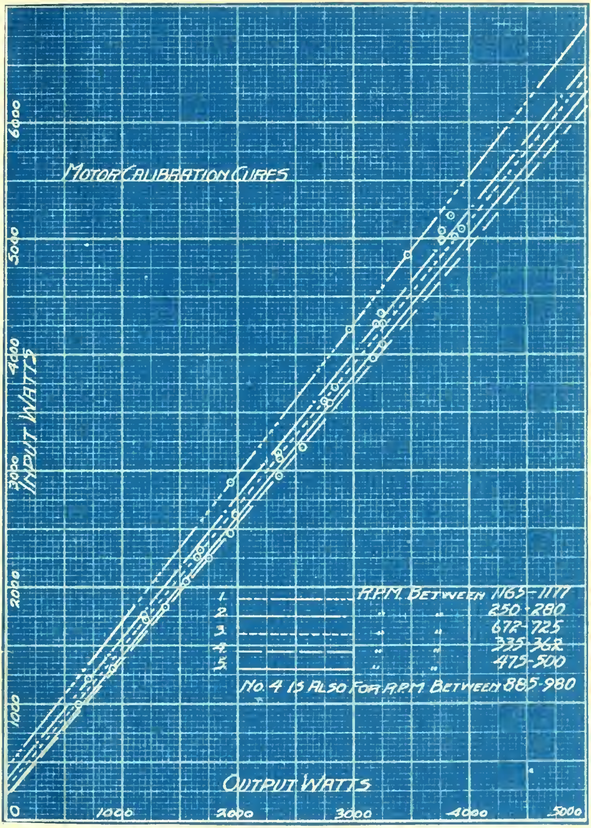
TEMPERATURE 75°F

MANOMETER READING 2" H_2O

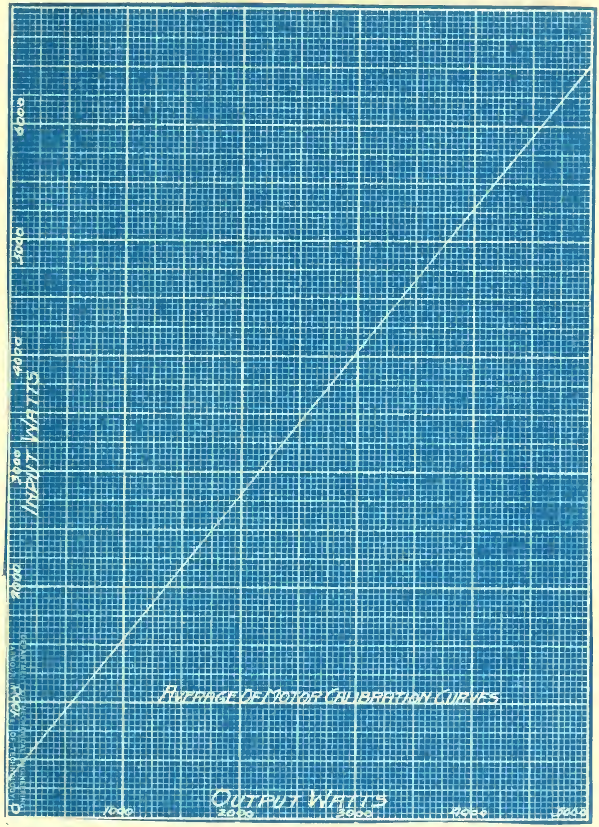
0"	.1060	.1055	.1060	———	.1058	.1027
1.0"	.1050	.1050	.1060	.1060	.1055	.1025
2.0"	.1045	.1045	.1060	.1060	.1050	.1023
3.0"	.1040	.1040	.1050	.1055	.1046	.1022
3.75"	.1030	.1040	.1035	.1050	.1039	.1018
4.0"	.1025	.1025	.1035	.1035	.1030	.1017
4.25"	.1020	.1020	.1030	.1030	.1025	.1012
4.50"	.1010	.1010	.1020	.1020	.1015	.1007
4.75"	.1005	.1010	———	———	.1007	.1003

ZERO MANOMETER READING 1.4"

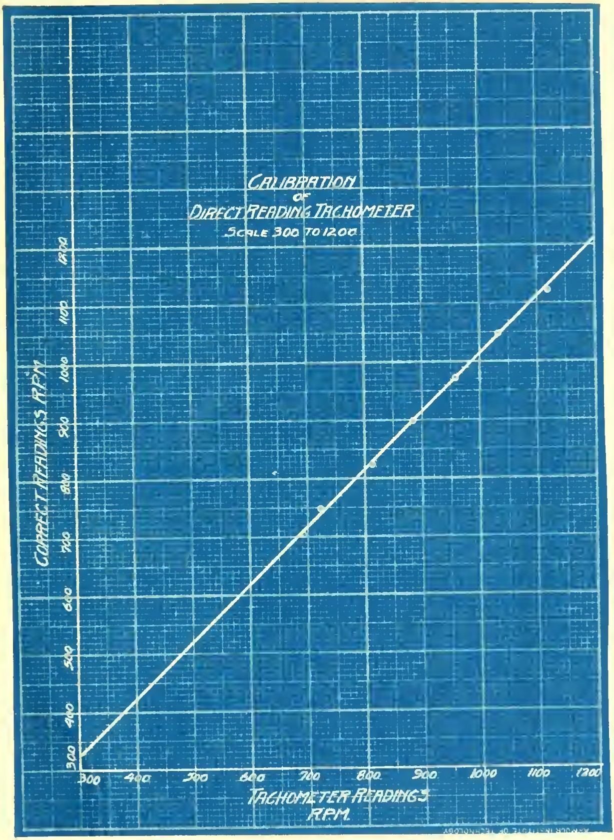
D


MOTOR CALIBRATION CURES
INPUT WATTS
6000
5000
4000
3000
2000
1000
0
1000
2000
3000
4000
5000
OUTPUT WATTS
1. R.P.M. BETWEEN 1165-1177
2. " " 250-280
3. " " 672-725
4. " " 335-362
5. " " 475-500
NO. 4 IS ALSO FOR R.P.M. BETWEEN 885-980

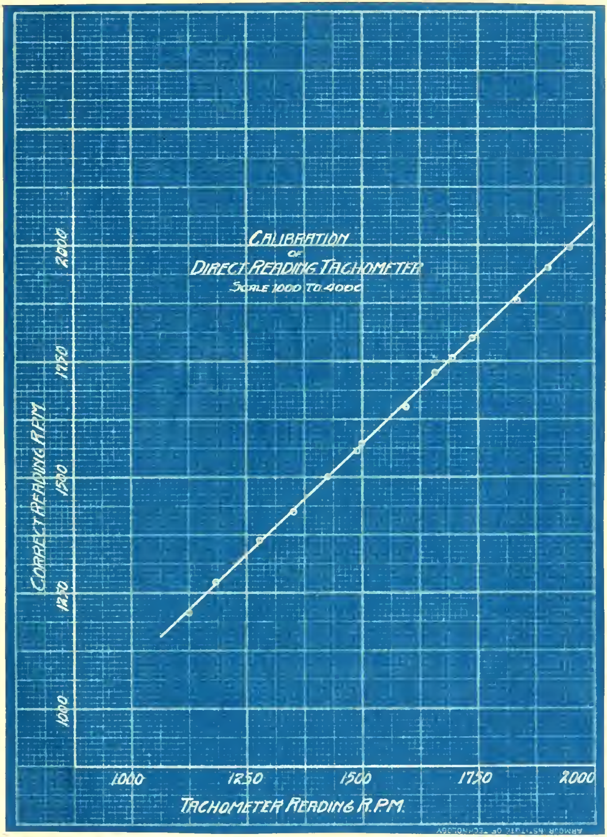
F.


AVERAGE DC MOTOR CALIBRATION CURVES
INPUT WATTS
OUTPUT WATTS
0
1000
2000
3000
4000
5000
6000
1000
2000
3000
4000
5000
DEPARTMENT OF MECHANICAL ENGINEERING
ARMOUR INSTITUTE OF TECHNOLOGY

6


CALIBRATION
OF
DIRECT READING TACHOMETER
SCALE 300 TO 1200
CORRECT READINGS R.P.M.
300
400
500
600
700
800
900
1000
1100
1200
TACHOMETER READINGS
R.P.M.
300
400
500
600
700
800
900
1000
1100
1200
ARMOUR INSTITUTE OF TECHNOLOGY

H


CALIBRATION
OF
DIRECT READING TACHOMETER
SCALE 1000 TO 4000
CORRECT READING R.P.M.
1000
1250
1500
1750
2000
TACHOMETER READING R.P.M.
1000
1250
1500
1750
2000

ARMOUR

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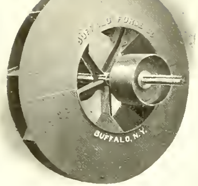

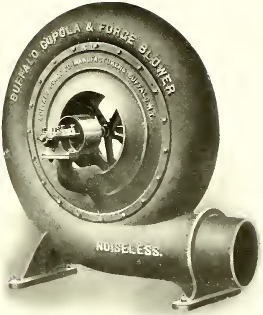
BUFFALO CUPOLA & FORGE BLOWER
BUFFALO FORGE CO. MANUFACTURERS BUFFALO, N.Y.
NOISELESS.

Standard Buffalo Steel Pressure Blower

BUFFALO BLOWER DATA

APRIL 1, 1909 A.M.

BAROMETER 29.58 "HG. ZERO DRAFT GAUGE .280

NO	ORIFICE DIA. INCHES	SPEED R.P.M.		GAUGES		MOTOR INPUT		TEMPERATURE	
		MOTOR	BLOWER	DRAFT	MANOMETER	VOLTS	AMPS	DUCT	ROOM
1	0	900	1420	.280	4.65	111.50	14.0	71.5	76.0
2	3	900	1415	.293	4.65	111.75	15.0	71.5	76.0
3	4	895	1410	.330	4.65	111.75	16.5	72.0	76.0
4	5	890	1390	.401	4.63	111.50	19.5	72.0	76.0
5	6	912	1390	.524	4.46	111.75	22.5	73.0	75.0
6	7	888	1410	.720	4.25	111.50	28.5	73.5	75.0
7	8	940	1460	1.080	3.65	110.50	38.5	74.0	75.0
8	10	925	1395	2.495	0.25	110.50	51.5	76.0	76.5

TEST OF BUFFALO BLOWER

LOG SHEET

DATE 4-1-09 A.M.

NO. OF BLADES 5

AREA DISCHARGE DUCT .5454 SQ FT.

OUTSIDE DIA OF FAN WHEEL 22.0 IN.

DIA. BLOWER PULLEY 7.25 IN.

WIDTH OF BLADES 6.0 IN.

DIA. MOTOR PULLEY 12.0 IN.

EFFECTIVE INLET AREA 1.25 SQ FT.

MEAN VELOCITY RADIUS OF DUCT 4.10 IN.

DIA. DISCHARGE DUCT 10 IN.

BAROMETER 29.58

AVERAGE RESULTS		1	2	3	4	5	6	7	8
DIA. DISCHARGE ORIFICE	IN.	10	8	7	6	5	4	3	0
AREA DISCHARGE ORIFICE	SQ.FT.	.5454	.3490	.2672	.1963	.0872	.0872	.0429	0
OUNCES OF PRESSURE		1.423	2.570	2.707	2.720	2.742	2.716	2.695	2.685
VELOCITY HEAD IN INS. OF WATER		2.215	.80	.44	.244	.121	.050	.013	0
VELOCITY HEAD IN FT. OF AIR		157.2	56.15	30.75	17.05	8.44	3.49	.906	0
STATIC HEAD IN INS. OF WATER		.250	3.65	4.25	4.46	4.63	4.65	4.65	4.65
STATIC HEAD IN FT OF AIR		17.76	256.3	297.0	311.4	322.8	3.24.4	324.4	324.4
DYNAMIC HEAD IN INS OF WATER		2.465	4.45	4.69	4.704	4.751	4.70	4.663	4.65
DYNAMIC HEAD IN FT OF AIR		174.96	312.45	327.75	328.45	331.24	327.89	325.306	3244
MEAN VELOCITY IN DUCT	FT/SEC.	100.37	60.00	44.40	33.01	23.26	14.93	7.63	0
TEMPERATURE IN DUCT	°F	76.0	74.5	73.0	73.5	72.0	72.0	71.5	71.5
VALUE OF CONSTANT		71.00	70.00	69.90	69.98	69.75	69.75	69.70	69.70
WEIGHT OF 1 CU FT. OF AIR IN DUCT	LBS	.07345	.07415	.07460	.07455	.07475	.07475	.07480	.07480
AIR MOVED PER SECOND	CU. FT.	54.75	32.74	24.21	18.01	12.69	8.15	4.162	0
AIR MOVED PER SECOND	LBS.	4.022	2.428	1.807	1.344	.948	.609	.312	0
WORK DONE IN MOVING AIR	FT.LBS.	703.9	759.5	591.5	441.7	314.0	199.9	101.2	0
WORK DONE IN MOVING AIR	H.P.	1.279	1.380	1.076	.804	.571	.364	.184	0
R.P.M. OF BLOWER		1470	1535	1485	1470	1485	1485	1490	1495
PERIPHERAL VEL. OF BLADES	FT/MIN.	8490	8860	8570	8490	8570	8570	8600	8630
R.P.M. OF MOTOR		940	955	930	905	925	910	920	920
AMMETER READING		51.5	38.5	28.5	23.0	19.8	16.5	15.0	14.0
VOLTMETER READING		110.0	110.5	111.5	111.75	111.50	111.75	111.75	111.50
IN PUT WATTS		5666.3	4250.1	3179.0	2575.0	2205.0	1842.0	1675.50	1562.00
MOTOR AND BELT EFFICIENCY	%	76.19	76.16	74.63	75.75	73.62	74.15	71.91	72.25
WORK SUPPLIED	FT.LBS.	191000	139800	105000	86100	71950	60500	53200	49940
WORK SUPPLIED	H.P.	5.788	4.238	3.180	2.610	2.180	1.833	1.612	1.513
EFFICIENCY OF BLOWER	%	22.10	32.58	33.82	30.80	26.20	19.81	11.40	0
CAPACITY COEFFICIENT		.362	.207	.159	.119	.083	.0535	.0272	0
HORSE POWER COEFFICIENT		18.95	12.21	10.13	8.55	6.94	5.83	5.07	4.71

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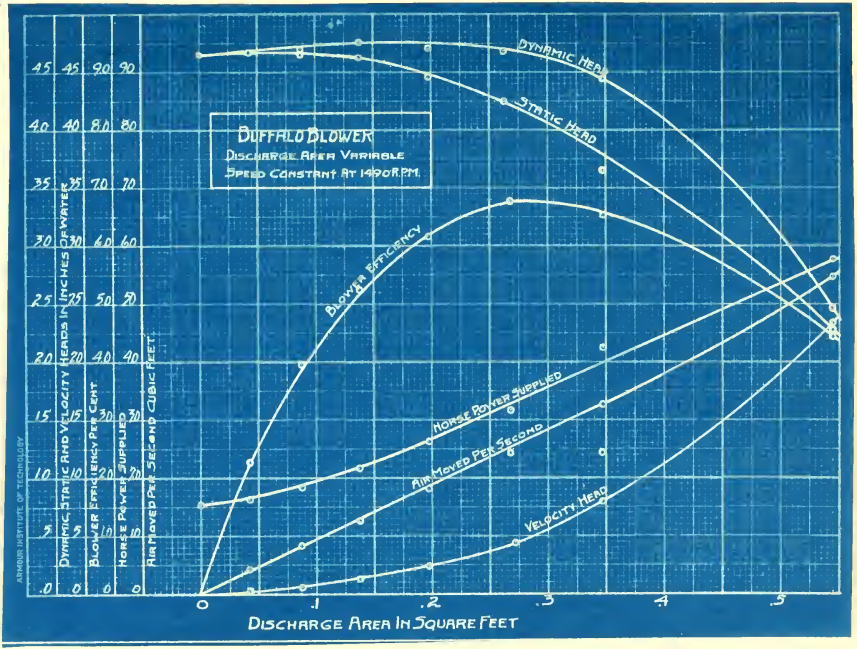
BUFFALO BLOWER
DISCHARGE AREA VARIABLE
SPEED CONSTANT AT 1490 R.P.M.
DYNAMIC HEAD
STATIC HEAD
BLOWER EFFICIENCY
HORSE POWER SUPPLIED
AIR MOVED PER SECOND
VELOCITY HEAD
DYNAMIC, STATIC AND VELOCITY HEADS IN INCHES OF WATER
BLOWER EFFICIENCY PER CENT
HORSE POWER SUPPLIED
AIR MOVED PER SECOND CUBIC FEET
.0 .5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5
0 5 10 15 20 25 30 35 40 45
0 10 20 30 40 50 60 70 80 90
0 10 20 30 40 50 60 70 80 90
0 .1 .2 .3 .4 .5
DISCHARGE AREA IN SQUARE FEET
ARMOUR INSTITUTE OF TECHNOLOGY

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BUFFALO BLOWER DATA

MARCH 29, 1909 P.M.

BAROMETER 2936" HG.

ZERO DRAFT GAUGE .220

NO.	ORIFICE DIA INCHES	SPEED R.P.M.		GAUGES		MOTOR INPUT		TEMPERATURE	
		BLOWER	MOTOR	DRAFT	MAN.	VOLTS	AMPS.	DUCT	ROOM
1	10	1040	645	1.400	.10	109.50	19.50	73.0	71.0
2	8	1055	640	.615	1.90	109.50	14.75	73.5	71.0
3	7	1060	650	.450	2.25	108.25	13.00	73.0	71.0
4	6	1060	640	.330	2.40	109.00	11.25	76.0	75.0
5	5	1070	655	.270	2.53	108.50	9.50	77.0	76.0
6	4	1070	655	.235	2.55	109.75	8.75	76.0	76.0
7	3	1075	655	.226	2.55	109.50	8.25	76.0	76.0
8	0	1080	655	.220	2.55	109.75	8.20	76.0	76.0
8	0	1080	655	.220	2.55	109.50	8.20	76.0	75.5
7	3	1080	655	.226	2.55	109.50	8.25	76.0	75.5
6	4	1075	655	.240	2.55	109.50	8.75	76.0	75.0
5	5	1070	655	.272	2.55	109.00	9.75	75.5	75.0
4	6	1070	650	.330	2.42	108.75	11.30	75.0	75.0
3	7	1060	645	.450	2.30	108.75	13.00	75.0	75.0
2	8	1050	640	.615	1.90	109.00	15.00	75.0	75.0
1	10	1045	640	1.410	.10	109.00	19.50	75.0	75.0

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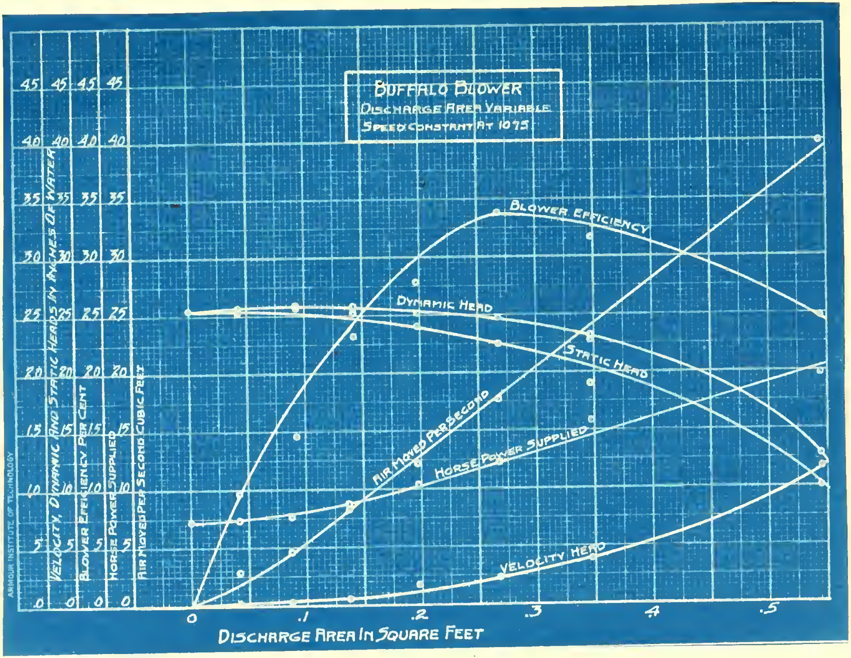
TEST OF BUFFALO BLOWER

LOG SHEET

DATE 4-29-09-A.M.

NO OF BLADES 5	AREA DISCHARGE DUCT .5454 SQ. FT.
OUTSIDE DIA. OF FAN WHEEL 22.0 INS.	DIA. BLOWER PULLEY 7.25 INS.
WIDTH OF BLADES 6.0 INS.	DIA MOTOR PULLEY 12.0 INS.
EFFECTIVE INLET AREA 1.25 SQ. FT.	MEAN VEL. RADIUS OF DUCT 4.10 INS.
DIA. DISCHARGE DUCT 10 INS	BAROMETER 29.36

AVERAGE RESULTS	1	2	3	4	5	6	7	8
DIA. DISCHARGE ORIFICE INS.	10	8	7	6	5	4	3	0
AREA DISCHARGE ORIFICE SQ.FT.	.5454	.3490	.2672	.1963	.1363	.0872	.0429	0
OUNCES OF PRESSURE	.739	1.326	1.433	1.450	1.490	1.483	1.477	1.473
VELOCITY HEAD IN INS OF WATER	1.18	.395	.230	.110	.05	.015	.006	0
VELOCITY HEAD IN FT. OF AIR	83.89	27.98	16.28	7.80	3.564	1.064	.426	0
STATIC HEAD IN INS. OF WATER	.10	1.9	2.25	2.40	2.53	2.55	2.55	2.55
STATIC HEAD IN FT. OF AIR	7.11	134.6	159.15	170.70	180.25	181.0	181.0	181.0
DYNAMIC HEAD IN INS OF WATER	1.28	2.295	2.48	2.51	2.58	2.565	2.556	2.55
DYNAMIC HEAD IN FT. OF AIR	91.00	162.58	175.43	778.50	183.834	182.064	181.926	181.00
MEAN VELOCITY IN DUCT FT./SEC.	73.31	42.36	32.30	22.37	15.10	8.27	5.22	0
TEMPERATURE IN DUCT °F	73.0	73.5	73.0	76.0	77.0	76.0	76.0	76.0
VALUE OF CONSTANT	71.11	70.85	70.76	71.10	71.21	71.00	71.00	71.00
WEIGHT 1 CU.FT. AIR IN DUCT LBS.	07321	.0735	07355	.07335	.0731	.0733	.0733	.0733
AIR MOVED PER SECOND CU. FT.	3997	23.08	17.61	12.20	8.24	4.51	2.85	0
AIR MOVED PER SECOND LBS.	2.927	1.698	1.296	.8948	.602	.3307	.2087	0
WORK DONE IN MOVING AIR FT.LBS.	266.4	276.0	227.3	159.8	110.70	60.22	37.86	0
WORK DONE IN MOVING AIR H.P.	.4842	.5016	.4135	.2904	.2010	.1095	.0688	0
R.P.M. OF BLOWER	1055	1065	1071	1071	1081	1081	1088	1092
PERIPHERAL VEL. OF BLADES FT./MIN.	6080	6140	6175	6240	6240	6240	6268	6300
R.P.M. OF MOTOR	670	665	675	665	680	680	680	680
AMMETER READING	19.50	14.75	13.00	11.25	9.50	8.75	8.25	8.20
VOLTMETER READING	109.5	109.5	108.25	109.0	108.5	109.75	109.5	109.75
INPUT WATTS	2138.50	1615.0	1409.5	1225.0	1020.50	960.50	909.50	900.00
MOTOR AND BELT EFFICIENCY %	68.83	73.39	64.67	63.48	62.10	58.56	58.37	58.24
WORK SUPPLIED FT. LBS.	65100	52400	40350	34440	28340	24890	2330	23195
WORK SUPPLIED H.P.	1.971	1.588	1.221	1.043	.859	.754	.7065	.7025
EFFICIENCY OF BLOWER %	24.56	31.59	33.85	27.84	23.40	14.51	9.74	0
CAPACITY COEFFICIENT	.368	.211	.160	.111	.074	.0406	.0255	0
HORSE POWER COEFFICIENT	17.50	13.70	10.30	8.85	7.07	6.21	5.70	5.60


BUFFALO BLOWER
DISCHARGE AREA VARIABLE
SPEED CONSTANT AT 1075
BLOWER EFFICIENCY
DYNAMIC HEAD
STATIC HEAD
AIR MOVED PER SECOND
HORSE POWER SUPPLIED
VELOCITY HEAD
VELOCITY, DYNAMIC AND STATIC HEADS IN INCHES OF WATER
BLOWER EFFICIENCY PER CENT
HORSE POWER SUPPLIED
AIR MOVED PER SECOND CUBIC FEET
0
5
10
15
20
25
30
35
40
45
.0
.5
1.0
1.5
2.0
2.5
3.0
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DISCHARGE AREA IN SQUARE FEET
ARMOUR INSTITUTE OF TECHNOLOGY

ARMOUR
INSTITUTE OF TECHNOLOGY
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BUFFALO BLOWER DATA

MARCH 29, 1909 P.M.

BAROMETER 29.29" HG.

ZERO DRAFT GAUGE 0.220

NO.	ORIFICE DIA. INCHES	R.P.M.		GAUGES		MOTOR INPUT		TEMPERATURE	
		MOTOR	BLOWER	DRAFT	MAN.	VOLTS	AMPS.	DUCT	ROOM
1	10	341	570	.590	0	113.00	7.00	62	62
2	10	415	675	.720	.05	112.50	8.50	66	65
3	10	488	802	.915	.10	112.25	11.25	68	69
4	10	585	950	1.280	.11	111.87	15.60	69	70
5	10	695	1115	1.640	.16	111.25	23.50	69	70
6	10	830	1225	1.890	.24	110.25	36.50	72	72
7	10	920	1290	2.020	.25	110.00	46.75	73	73
8	10	945	1410	2.270	.26	110.00	54.30	73	73

TEST OF BUFFALO BLOWER

LOG SHEET

DATE 3-29-09 A.M.

NO. OF BLADES 5

AREA DISCHARGE DUCT .5454 SQ. FT.

OUTSIDE DIA. OF FAN WHEEL 22.0 IN.

DIA. BLOWER PULLEY 7.25 IN.

WIDTH OF BLADES 6.0 IN.

DIA. MOTOR PULLEY 12.0 IN.

EFFECTIVE INLET AREA 1.25 SQ. FT.

MEAN VELOCITY RADIUS OF DUCT 4.10 IN.

DIA. DISCHARGE DUCT 10 IN.

BAROMETER 29.29 IN. HG.

AVERAGE RESULTS		1	2	3	4	5	6	7	8
DIA. DISCHARGE ORIFICE	IN.	10	10	10	10	10	10	10	10
AREA DISCHARGE ORIFICE	SQ. FT.	.5454	.5454	.5454	.5454	.5454	.5454	.5454	.5454
OUNCES OF PRESSURE		.214	.318	.459	.655	.913	1.102	1.183	1.333
VELOCITY HEAD IN INS. OF WATER		.37	.50	.695	1.06	1.42	1.67	1.80	2.05
VELOCITY HEAD IN FT. OF AIR		25.83	35.20	49.05	75.00	100.45	118.80	128.35	146.10
STATIC HEAD IN INS. OF WATER		0	.05	.10	.11	.16	.24	.25	.26
STATIC HEAD IN FT. OF AIR		0	3.52	7.06	7.79	11.32	17.10	17.82	18.53
DYNAMIC HEAD IN INS. OF WATER		.37	.55	.795	1.17	1.58	1.91	2.05	2.31
DYNAMIC HEAD IN FT. OF AIR		25.83	38.72	56.11	82.79	111.77	135.90	146.17	164.63
MEAN VELOCITY IN DUCT	FT./SEC.	40.71	47.50	56.08	69.40	80.35	87.32	90.71	96.70
TEMPERATURE IN DUCT	°F	62	66	68	69	69	72	73	73
VALUE OF CONSTANT		69.85	70.40	70.60	70.80	70.80	71.15	71.30	71.30
WEIGHT / CU. FT. AIR IN DUCT	LBS.	.0746	.0741	.0738	.0736	.0736	.0732	.0731	.0731
AIR MOVED PER SECOND	CU. FT.	22.22	25.93	30.60	37.84	43.85	47.65	49.50	52.82
AIR MOVED PER SECOND	LBS.	1.657	1.920	2.260	2.786	3.227	3.492	3.620	3.860
WORK DONE IN MOVING AIR	FT. LBS.	42.85	74.35	126.90	230.9	360.8	474.5	529.5	635.0
WORK DONE IN MOVING AIR	H.P.	.0778	.1352	.2307	.4195	.6560	.8630	.9630	1.1545
R.P.M. OF BLOWER		596	700	812	905	1125	1310	1370	1485
PERIPHERAL VEL. OF BLADES	FT./MIN.	3436	4038	4680	5212	6490	7550	7900	8550
R.P.M. OF MOTOR		378	450	518	612	716	850	938	960
AMMETER READING		7.00	8.50	11.25	15.60	23.55	36.50	46.75	54.30
VOLTMETER READING		113.00	112.50	112.25	111.87	111.25	110.25	110.00	110.00
INPUT WATTS		790.50	956.50	1264.50	1741.30	2585.0	3914.50	5150.00	5980.30
MOTOR AND BELT EFFICIENCY	%	59.90	64.83	69.23	72.59	69.83	73.26	69.84	74.20
WORK SUPPLIED	FT. LBS.	20970	27410	38730	55980	81050	130700	159000	196250
WORK SUPPLIED	H.P.	.635	.830	1.173	1.697	2.456	3.960	4.812	5.950
EFFICIENCY OF BLOWER	%	12.26	16.29	19.57	24.80	26.73	21.80	20.00	19.41
CAPACITY COEFFICIENT		.362	.360	.366	.406	.378	.354	.352	.346
HORSE POWER COEFFICIENT		31.20	25.20	22.80	23.80	18.00	18.40	19.50	18.90

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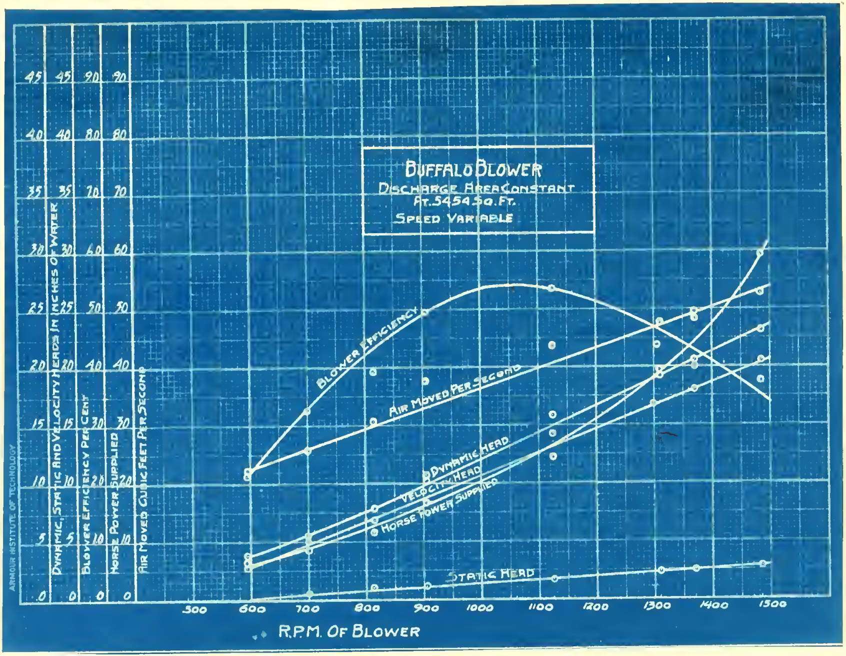
BUFFALO BLOWER
DISCHARGE AREA CONSTANT
AT .5454 SQ. FT.
SPEED VARIABLE
BLOWER EFFICIENCY
AIR MOVED PER SECOND
DYNAMIC HEAD
VELOCITY HEAD
HORSE POWER SUPPLIED
STATIC HEAD
DYNAMIC, STATIC AND VELOCITY HEADS IN INCHES OF WATER
BLOWER EFFICIENCY PER CENT
HORSE POWER SUPPLIED
AIR MOVED CUBIC FEET PER SECOND
45 45 90 90
40 40 80 80
35 35 70 70
30 30 60 60
25 25 50 50
20 20 40 40
15 15 30 30
10 10 20 20
5 5 10 10
0 0 0 0
500
600
700
800
900
1000
1100
1200
1300
1400
1500
R.P.M. OF BLOWER
ARMOUR INSTITUTE OF TECHNOLOGY

BUFFALO BLOWER DATA

MARCH 3, 1909 A.M.

BAROMETER 29.29

ZERO DRAFT GAUGE .220

NO.	ORIFICE DIA. INCHES	SPEED R.P.M.		GAUGES		MOTOR INPUT		TEMPERATURE	
		MOTOR	BLOWER	DRAFT	MAN.	VOLTS	AMPS.	DUCT	ROOM
1	8	340	570	.350	.60	110.00	6.25	68.0	70.0
2	8	415	675	.398	.78	110.50	7.25	68.0	70.0
3	8	490	810	.470	1.09	110.90	9.20	68.0	70.0
4	8	590	965	.570	1.54	110.50	12.25	69.0	71.0
5	8	715	1155	.710	2.22	110.25	18.25	69.0	71.0
6	8	845	1275	.905	2.92	110.50	27.50	70.5	71.5
7	8	915	1390	1.000	3.32	109.50	34.75	73.0	72.0
8	8	950	1460	1.050	3.65	108.50	40.00	72.0	72.0

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TEST OF BUFFALO BLOWER

LOG SHEET

NO. OF BLADES 5

OUTSIDE DIA. OF FAN WHEEL 22.0 IN.

WIDTH OF BLADES 6.0 IN.

EFFECTIVE INLET AREA 1.25 SQ. FT.

DIA. DISCHARGE DUCT 10 IN.

AREA DISCHARGE DUCT .5454 SQ. FT.

DIA. BLOWER PULLEY 7.25 IN.

DIA. MOTOR PULLEY 12.0 IN

MEAN VELOCITY RADIUS OF DUCT 4.10 IN

BAROMETER 29.29

DATE 3-29-09 A.M.

AVERAGE RESULTS	1	2	3	4	5	6	7	8
DIA. DISCHARGE ORIFICE IN.	8	8	8	8	8	8	8	8
AREA DISCHARGE ORIFICE SQ. FT.	.349	.349	.349	.349	.349	.349	.349	.349
OUNCES OF PRESSURE	.421	.554	.774	1.091	1.565	2.082	2.367	2.588
VELOCITY HEAD IN INS. OF WATER	.13	.178	.25	.35	.49	.685	.78	.83
VELOCITY HEAD IN FT. OF AIR	9.19	12.58	17.63	24.69	34.46	48.30	55.18	58.38
STATIC HEAD IN INS. OF WATER	.60	.78	1.09	1.54	2.22	2.92	3.32	3.65
STATIC HEAD IN FT. OF AIR	42.29	55.12	76.90	108.65	156.00	206.00	234.8	256.7
DYNAMIC HEAD IN INS. OF WATER	.73	.958	1.34	1.89	2.71	3.605	4.10	4.48
DYNAMIC HEAD IN FT. OF AIR	51.48	67.70	94.53	133.34	190.46	254.3	289.98	318.08
MEAN VELOCITY IN DUCT FT/SEC	24.28	28.53	33.60	39.78	47.00	55.60	59.45	61.15
TEMPERATURE IN DUCT °F	68	68	68	69	69	70.5	73.5	72.0
VALUE OF CONSTANT	70.50	70.61	70.52	70.50	70.37	70.50	70.75	70.35
WEIGHT 1 CU. FT. AIR IN DUCT LBS	.0738	.07385	.07390	.0740	.0740	.0739	.0736	.0740
AIR MOVED PER SECOND CU. FT.	13.24	15.56	18.33	21.73	25.66	30.33	32.41	33.35
AIR MOVED PER SECOND LBS.	.9785	1.1480	1.354	1.608	1.899	2.240	3.385	2.467
WORK DONE IN MOVING AIR FT. LBS.	50.32	76.95	128.10	214.4	361.8	570.0	689.5	776.90
WORK DONE IN MOVING AIR H.P.	.0914	.140	.2328	.3896	.6575	1.0365	1.253	1.4125
R.P.M. OF BLOWER	600	700	830	980	1165	1360	1470	1535
PERIPHERAL VEL. OF BLADES FT/MIN.	3460	4040	4740	5650	6710	7840	8470	8850
R.P.M. OF MOTOR	375	450	521	615	740	865	930	965
AMMETER READING	6.25	7.25	9.20	12.25	18.25	27.50	34.75	40.0
VOLTMETER READING	110.0	110.5	110.9	110.5	110.5	110.25	109.5	108.5
INPUT WATTS	687.5	801.125	1020.28	1353.63	2016.63	3031.88	3805.23	4340.0
MOTOR AND BELT EFFICIENCY	59.13	62.71	67.81	63.92	68.33	72.04	74.65	75.79
WORK SUPPLIED FT. LBS.	17980	22210	30640	38300	61000	967000	125900	145500
WORK SUPPLIED H.P.	.545	.6735	.9285	1.1605	1.848	2.932	3.813	4.410
EFFICIENCY OF BLOWER %	16.76	20.80	25.09	33.56	35.57	35.35	32.88	32.04
CAPACITY COEFFICIENT	.215	.216	.215	.215	.223	.217	.214	.211
HORSE POWER COEFFICIENT	26.28	20.45	16.91	12.87	12.07	12.15	12.50	12.71

ARMOUR
INSTITUTE OF TECHNOLOGY
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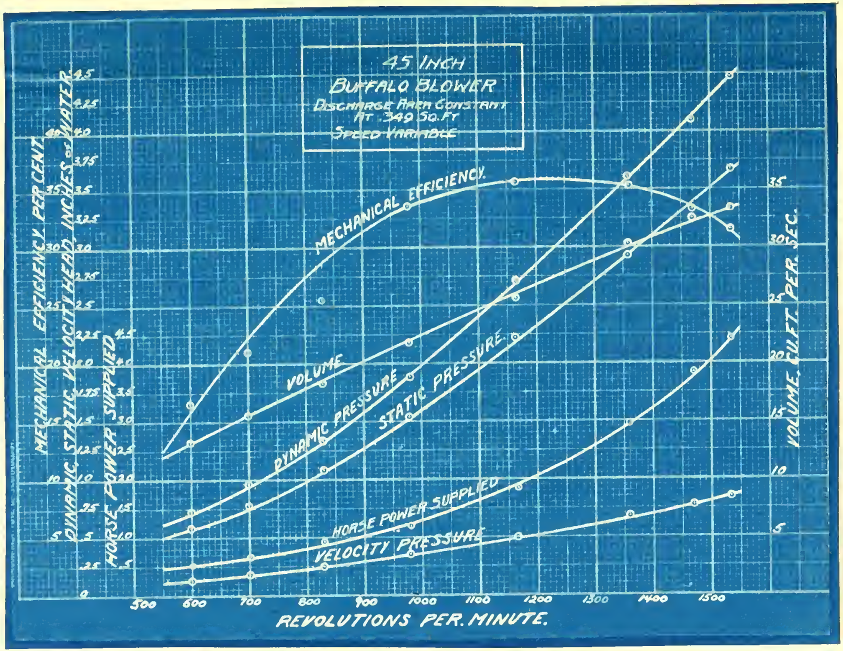
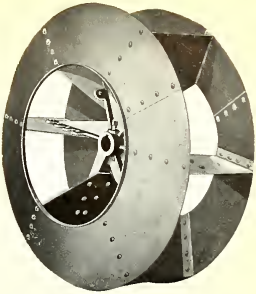
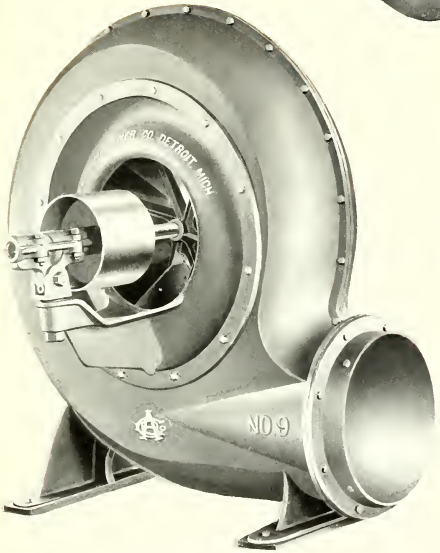

45 INCH
BUFFALO BLOWER
DISCHARGE AREA CONSTANT
AT .349 SQ. FT
SPEED VARIABLE
MECHANICAL EFFICIENCY
VOLUME
DYNAMIC PRESSURE
STATIC PRESSURE
HORSE POWER SUPPLIED
VELOCITY PRESSURE
MECHANICAL EFFICIENCY PER CENT
DYNAMIC STATIC VELOCITY HEAD, INCHES of WATER
HORSE POWER SUPPLIED
VOLUME, CU. FT. PER. SEC.
REVOLUTIONS PER. MINUTE.
500
600
700
800
900
1000
1100
1200
1300
1400
1500





The "A B C" Steel Pressure Blower

AMERICAN BLOWER DATA

APRIL 8, 1909 A.M.

BAROMETER = 29.74" HG.

ZERO DRAFT GAUGE = .340

No.	Orifice Inches	Speeds R.P.M.		Gauges		Motor Input		Temperature	
		Motor	Blower	Draft	Manometer	Volts	Amps.	Duct	Room
1	0	835	1415	.340	4.48	113.50	8.0	66.0	62.0
2	3	838	1420	.360	4.45	113.75	9.0	65.5	63.0
3	4	838	1415	.380	4.25	113.50	9.5	65.5	64.0
4	5	843	1425	.436	4.00	113.75	11.0	65.5	63.5
5	6	837	1420	.542	3.78	113.25	12.0	65.0	63.5
6	7	835	1415	.705	3.00	110.00	14.00	65.0	64.0
7	8	838	1415	.980	2.55	113.50	13.75	65.0	64.0
8	10	835	1415	1.910	.250	111.25	21.50	65.0	64.0
8	10	833	1410	1.915	.250	111.50	21.50	67.0	65.0
7	8	844	1420	.970	2.60	111.00	16.50	66.5	70.0
6	7	845	1420	.693	3.25	111.50	14.00	67.0	70.0
5	6	838	1410	.530	3.85	111.50	12.25	67.0	70.0
4	5	838	1420	.419	4.15	112.50	10.50	67.0	70.0
3	4	838	1410	.365	4.28	111.50	9.75	67.0	68.0
2	3	840	1415	.350	4.46	112.50	8.50	66.5	67.0
1	0	842	1420	.340	4.50	111.50	7.25	66.0	65.0
1	0	842	1425	.340	4.50	111.25	7.75	66.0	65.0
2	3	832	1415	.350	4.42	111.00	9.00	65.0	65.0
3	4	838	1415	.363	4.30	111.25	9.80	65.0	65.0
4	5	832	1415	.410	4.15	111.00	10.75	65.0	66.0
5	6	837	1415	.525	3.90	111.00	12.00	66.0	68.0
6	7	830	1410	.708	3.30	111.00	13.75	66.0	67.0
7	8	830	1415	.975	2.55	113.25	15.50	66.0	66.0
8	10	830	1415	1.895	0.18	112.50	20.50	66.0	65.0

V

TEST OF AMERICAN BLOWER

LOG SHEET

DATE 4-8-09 A.M

NUMBER OF BLADES	6	AREA DISCHARGE DUCT	.5454 SQ.FT.
OUTSIDE DIA. OF FAN WHEEL	19 INS.	DIA. BLOWER PULLEY	6 7/8 INS
WIDTH OF BLADES	8 INS.	DIA. MOTOR PULLEY	12.0 INS.
EFFECTIVE INLET AREA	.885 SQ.FT.	MEAN VELOCITY RADIUS OF DUCT	4.10 IN.
DIAM DISCHARGE DUCT	10.0 INS	BAROMETER	29.74

AVERAGE RESULTS	1	2	3	4	5	6	7	8
DIA. DISCHARGE ORIFICE IN	10	8	7	6	5	4	3	0
AREA DISCHARGE ORIFICE SQ.FT.	.5454	.3490	.2672	.1963	.1363	.0872	.0429	0
OUNCES OF PRESSURE	1.037	1.851	1.990	2.355	2.419	2.493	2.575	2.614
VELOCITY HEAD IN IN. OF WATER	1.566	.635	.362	.1920	.082	.031	.014	0
VELOCITY HEAD IN FT. OF AIR	108.55	43.70	24.93	13.19	5.62	2.13	.96	0
STATIC HEAD IN IN. OF WATER	.226	2.57	3.18	3.88	4.10	4.28	4.44	4.52
STATIC HEAD IN FT OF AIR	15.68	176.90	218.80	266.5	281.2	293.5	304.3	310.0
DYNAMIC HEAD IN IN. OF WATER	1.792	3.205	3.442	4.072	4.182	4.311	4.454	4.52
DYNAMIC HEAD IN FT. OF AIR	124.23	220.6	243.73	279.69	286.82	295.63	305.26	310.00
MEAN VELOCITY IN DUCT FT./SEC.	83.45	52.95	39.95	29.04	18.98	11.68	7.85	0
TEMPERATURE IN DUCT °F	66.0	65.8	67.0	67.2	66.2	66.0	65.0	64.0
VALUE OF CONSTANT	69.39	68.86	68.85	68.60	68.55	68.50	69.50	68.50
WEIGHT OF 1 CU. FT. OF AIR IN DUCT LBS	.07515	.0756	.0757	.0759	.07595	.0760	.0761	.0760
AIR MOVED PER SECOND CU. FT.	45.52	28.89	21.80	15.85	10.36	6.37	4.28	0
AIR MOVED PER SECOND LBS.	3.422	2.184	1.672	1.202	.787	.484	.326	0
WORK DONE IN MOVING AIR FT.LBS./SEC.	425.0	482.0	407.7	336.4	225.9	143.20	99.45	0
WORK DONE IN MOVING AIR H.P.	.7735	.8770	.7410	.6117	.4106	.2603	.1809	0
R.P.M. OF BLOWER	1481	1488	1487	1487	1490	1490	1486	1493
PERIPHERAL VEL. OF BLADES FT./MIN.	7380	7405	7400	7400	7423	7423	7395	7440
R.P.M. OF MOTOR	848	852	851	852	853	853	851	855
AMMETER READING	21.17	15.25	13.92	12.08	10.75	9.68	8.83	7.66
VOLTMETER READING	111.75	112.58	110.83	111.92	112.42	112.08	112.25	112.08
INPUT WATTS	2360.5	1717.0	1542.6	1350.6	1210.0	1088.4	991.50	860.50
MOTOR AND BELT EFFICIENCY %	76.50	74.38	72.95	72.05	70.35	67.75	67.60	67.60
WORK SUPPLIED FT.LBS.	80050	56400	49800	43120	37600	32550	29620	25660
WORK SUPPLIED H.P.	2.436	1.709	1.509	1.307	1.139	.986	.898	.778
EFFICIENCY OF BLOWER %	31.74	51.30	49.11	45.68	36.09	26.40	20.07	0
CAPACITY COEFFICIENT	.464	293	.222	.161	.105	.0645	.0435	0
HORSE POWER COEFFICIENT	16.27	11.24	9.97	8.64	7.47	6.45	5.94	5.05

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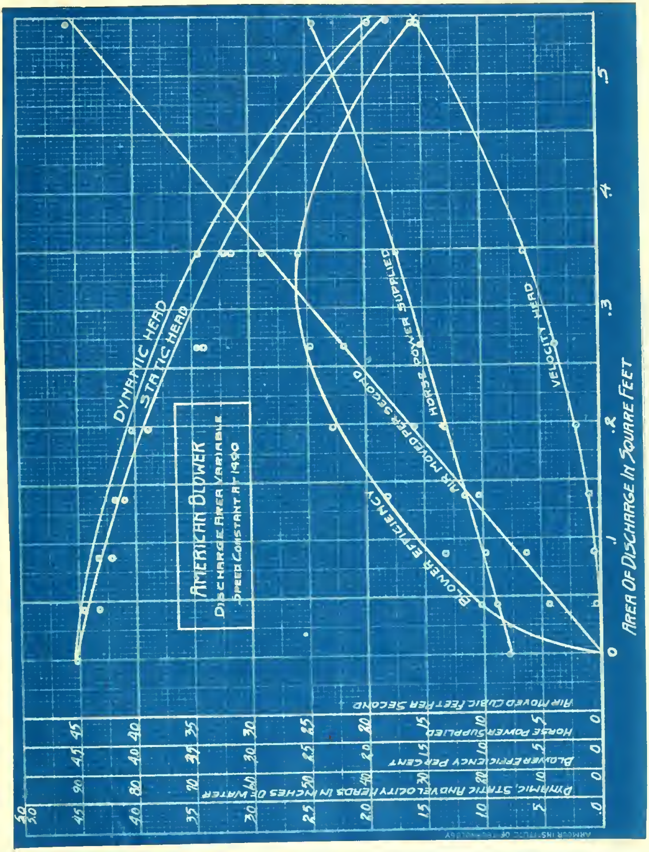
AMERICAN BLOWER
DISCHARGE AREA VARIABLE
SPEED CONSTANT AT 1900
DYNAMIC HEAD
STATIC HEAD
AIR MOVED PER SECOND
BLOWER EFFICIENCY
HORSE POWER SUPPLIED
VELOCITY HEAD
AREA OF DISCHARGE IN SQUARE FEET
0 .1 .2 .3 .4 .5
AIR MOVED CUBIC FEET PER SECOND
0 5 10 15 20 25 30 35 40 45
HORSE POWER SUPPLIED
0 .5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5
BLOWER EFFICIENCY PER CENT
0 10 20 30 40 50 60 70 80 90
DYNAMIC, STATIC AND VELOCITY HEADS IN INCHES OF WATER
.0 .5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DD

ARMOUR
INSTITUTE OF TECHNOLOGY
[illegible]

AMERICAN BLOWER DATA

APRIL 8, 1909 A.M.

BAROMETER 29.74" HG.

ZERO DRAFT GAUGE = .2740

No.	ORIFICE DIA. INCHES	R.P.M.		GAUGES		MOTOR INPUT		TEMPERATURE	
		MOTOR	BLOWER	DRAFT	MAN.	VOLTS	AMPS	DUCT	ROOM
1	0	620	1080	.274	2.48	113.5	5.00	72.0	72.0
2	3	620	1080	.282	2.42	113.5	5.50	72.0	72.0
3	4	620	1080	.294	2.38	113.5	5.75	72.0	72.0
4	5	620	1080	.326	2.20	113.5	6.25	72.0	72.0
5	6	612	1080	.384	2.05	113.5	7.00	72.5	73.0
6	7	615	1070	.480	1.75	113.5	7.50	72.5	73.0
7	8	610	1065	.620	1.30	113.5	8.25	73.0	73.5
8	10	608	1060	1.118	0.15	113.5	10.00	73.0	74.0
8	10	613	1070	1.1035	.12	113.75	9.90	73.0	74.0
7	8	618	1075	.615	1.35	114.50	8.00	72.5	74.0
6	7	613	1075	.475	1.78	114.50	7.00	72.5	74.0
5	6	620	1080	.376	2.10	114.50	6.75	72.0	75.0
4	5	618	1080	.325	2.22	114.75	6.00	72.0	74.0
3	4	618	1078	284	2.40	114.25	5.50	72.0	73.0
2	3	619	1078	.270	2.45	114.50	5.00	72.0	73.0
1	0	620	1080	.260	2.50	114.75	4.75	72.0	72.0
1	0	620	1080	.260	2.50	114.75	4.75	72.0	72.0
2	3	619	1078	.270	2.45	114.50	5.20	72.0	73.0
3	4	619	1078	.285	2.40	114.75	5.75	72.0	74.0
4	5	618	1078	.319	2.25	114.25	6.00	72.0	74.0
5	6	613	1075	375	2.05	113.75	6.50	71.0	72.0
6	7	614	1077	.475	1.80	114.00	7.25	70.0	73.0
7	8	613	1070	.620	1.40	114.25	7.90	72.0	72.0
8	10	608	1060	1.104	.12	114.00	9.90	73.0	75.0

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TEST OF AMERICAN BLOWER

LOG SHEET

DATE 4-8-09 A.M.

NO OF BLADES 6

AREA DISCHARGE DUCT .5454 SQ. FT.

OUTSIDE DIA OF FAN WHEEL 19 INS.

DIA BLOWER PULLEY 6.875 INS.

WIDTH OF BLADES 8 INS.

DIA MOTOR PULLEY 12 INS

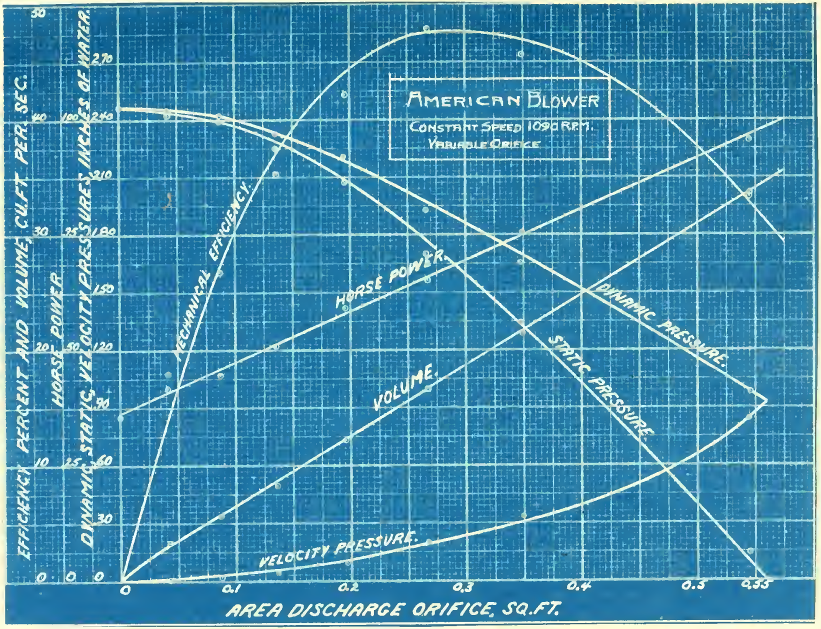
EFFECTIVE INLET AREA .885 SQ FT.

MEAN VELOCITY RADIUS OF DUCT 4.10 INS.

DIA DISCHARGE DUCT 10 INS

BAROMETER 29.74

AVERAGE RESULTS		1	2	3	4	5	6	7	8
DIA DISCHARGE ORIFICE	INS.	0	3	4	5	6	7	8	10
AREA DISCHARGE ORIFICE	SQ. FT.	0	.0429	.0872	.1363	.1963	.2672	.3490	.5454
OUNCES OF PRESSURE		1.433	1.400	1.391	1.320	1.260	1.147	.999	.574
VELOCITY HEAD IN INS OF WATER		0	.008	.020	.052	.110	.206	.346	.844
VELOCITY HEAD IN FT OF AIR		0	.558	1.397	3.63	7.68	14.39	24.20	59.22
STATIC HEAD IN INS OF WATER		2.48	2.42	2.39	2.23	2.07	1.78	1.35	.15
STATIC HEAD IN FT OF AIR		173.0	168.9	166.8	155.7	144.5	124.25	94.45	10.53
DYNAMIC HEAD IN INS OF WATER		2.48	2.428	2.410	2.282	2.180	1.986	1.696	.994
DYNAMIC HEAD IN FT OF AIR		173.0	169.46	168.2	159.33	152.18	138.64	118.65	69.75
MEAN VELOCITY IN DUCT	FT/SEC.	0	5.99	9.46	15.26	22.20	30.40	39.40	61.60
TEMPERATURE IN DUCT	°F	72.0	72.0	72.0	72.0	72.5	72.5	73.0	73.0
VALUE OF CONSTANT		69.80	69.80	69.81	69.82	69.83	69.89	70.00	70.20
WEIGHT OF 1 CU FT AIR IN DUCT	LBS.	.07475	.07475	.07474	.07474	.07461	.07460	.07445	.07415
AIR MOVED PER SECOND	CU. FT.	0	3.27	5.16	8.32	12.11	16.60	21.47	33.63
AIR MOVED PER SECOND	LBS.	0	.244	.386	.622	.905	1.239	1.599	2.496
WORK DONE IN MOVING AIR	FT. LBS.	0	41.42	65.00	98.12	137.75	171.80	189.70	179.0
WORK DONE IN MOVING AIR	H.P.	0	.0753	.1181	.1802	.2504	.3120	.3495	.3166
R.P.M. OF BLOWER		1094	1094	1094	1094	1094	1085	1080	1075
PERIPHERAL VEL. OF BLADES	FT/MIN.	5452	5452	5452	5452	5452	5403	5385	5355
R.P.M. OF MOTOR		642	642	692	692	692	634	632	630
AMMETER READING		5.00	5.50	5.75	6.25	7.00	7.50	8.25	10.00
VOLTMETER READING		113.5	113.5	113.5	113.5	113.5	113.5	113.5	113.5
INPUT WATTS		567.5	624.95	650.5	710.0	795.0	850.5	946.5	1135.0
MOTOR AND BELT EFFICIENCY	%	46.50	50.21	50.23	53.70	55.70	57.00	60.18	62.51
WORK SUPPLIED	FT. LBS.	11670	13870	14500	16870.0	19600	21470	24960	31400
WORK SUPPLIED	H.P.	.3538	.4200	.4390	.5110	.5940	.6510	.7560	.9510
EFFICIENCY OF BLOWER	%	0	17.91	26.90	35.27	42.14	47.96	45.60	33.25
CAPACITY COEFFICIENT		0	.0451	.0711	.115	.167	.231	.300	.574
HORSE POWER COEFFICIENT		5.87	6.96	7.27	8.48	9.83	10.78	13.02	16.63


AMERICAN BLOWER
CONSTANT SPEED 1090 R.P.M.
VARIABLE ORIFICE
EFFICIENCY PERCENT AND VOLUME, CU.FT. PER. SEC.
HORSE POWER
DYNAMIC, STATIC, VELOCITY PRESSURES, INCHES OF WATER.
AREA DISCHARGE ORIFICE, SQ.FT.
MECHANICAL EFFICIENCY.
HORSE POWER.
DYNAMIC PRESSURE.
STATIC PRESSURE.
VOLUME.
VELOCITY PRESSURE.
0
0.1
0.2
0.3
0.4
0.5
0.55
0
10
20
30
40
50
0
25
50
75
100
0
.30
.60
.90
1.20
1.50
1.80
2.10
2.40
2.70

EE

AMERICAN BLOWER DATA

APRIL 7, 1909 A.M

BAROMETER = 29.50" HG

ZERO DRAFT GAUGE = .330

No.	ORIFICE DIA. INCHES	SPEED R.P.M.		GAUGES		MOTOR INPUT		TEMPERATURES	
		MOTOR	BLOWER	DRAFT	MANOMETER	VOLTS	AMPS.	DUCT	ROOM
1	10	320	565	.600	.05	110.75	5.50	72	76
2	10	375	660	.695	.05	111.25	6.00	73	76
3	10	458	805	.860	.06	111.00	7.25	74	76
4	10	545	952	1.065	.08	110.75	9.50	74	76
5	10	655	1145	1.385	.10	110.50	13.50	76	76
6	10	775	1275	1.690	.118	110.25	19.25	78	77
7	10	845	1400	1.910	.130	110.25	23.75	78	78
8	10	910	1520	2.110	.138	110.50	28.50	80.5	79
8	10	911	1500	2.100	.134	110.00	28.60	77.0	76
7	10	848	1400	1.905	.128	110.25	23.50	77.5	78
6	10	788	1290	1.705	.120	110.25	19.75	80.5	79
5	10	735	1180	1.500	.108	110.50	17.00	79.5	79
4	10	550	965	1.058	.100	111.00	9.75	79.3	79
3	10	465	815	.850	.090	111.00	7.75	79.0	79
2	10	375	675	.670	.070	111.25	6.00	79.0	80
1	10	320	570	.589	.060	111.50	5.75	78.5	80
1	10	320	570	.580	.050	112.50	5.25	76.0	78.0
2	10	375	665	.668	.055	112.50	6.00	76.0	78.0
3	10	460	805	.830	.064	112.50	7.00	76.5	79.0
4	10	550	955	1.030	.080	112.50	9.25	77.0	79.0
5	10	660	1155	1.342	.095	112.25	13.25	78.0	79.5
6	10	790	1300	1.730	.120	111.75	19.75	80.0	80.0
7	10	845	1410	1.914	.135	111.50	23.75	80.5	80.0
8	10	905	1500	2.115	.140	111.25	27.50	80.5	80.5

BB

TEST OF AMERICAN BLOWER

LOG SHEET

DATE 4-7-09-P.M

NO OF BLADES 6

AREA DISCHARGE DUCT .5454 SQ. FT.

OUTSIDE DIA. OF FAN WHEEL 19 INS.

DIA. BLOWER PULLEY 6.875 INS.

WIDTH OF BLADES 8 INS.

DIA. MOTOR PULLEY 12.0 INS.

EFFECTIVE INLET AREA .885 SQ. FT.

MEAN VELOCITY RADIUS OF DUCT 4.10 INS.

DIA. DISCHARGE DUCT 10.0 INS.

BAROMETER

AVERAGE RESULTS		1	2	3	4	5	6	7	8
DIA. DISCHARGE ORIFICE	IN.	10	10	10	10	10	10	10	10
AREA DISCHARGE ORIFICE	SQ. FT.	.5454	.5454	.5454	.5454	.5454	.5454	.5454	.5454
OUNCES OF PRESSURE		.181	.235	.342	.469	.651	.865	.990	1.106
VELOCITY HEAD IN INS. OF WATER		.261	.349	.53	.722	1.030	1.379	1.581	1.78
VELOCITY HEAD IN FT. OF AIR		18.59	24.85	37.59	51.50	73.61	98.85	113.10	127.70
STATIC HEAD IN INS OF WATER		.053	.058	.061	.090	.098	.119	.131	.137
STATIC HEAD IN FT. OF AIR		3.776	4.135	4.325	6.415	7.010	8.535	9.40	9.815
DYNAMIC HEAD IN INS. OF WATER		.314	.407	.591	.812	1.128	1.498	1.712	1.917
DYNAMIC HEAD IN FT OF AIR		22.336	28.785	41.915	57.915	80.625	107.385	122.50	137.515
MEAN VELOCITY IN DUCT	FT./SEC.	34.48	39.87	49.07	57.45	68.75	79.71	85.15	90.45
TEMPERATURE IN DUCT	°F	75.5	76.0	74.0	76.7	78.0	79.5	78.6	79.3
VALUE OF CONSTANT		71.20	71.22	70.90	71.30	71.50	71.70	71.50	71.70
WEIGHT 1 CU. FT. OF AIR IN DUCT	LBS	.07315	.0731	.07345	.0731	.07285	.0727	.0728	.07273
AIR MOVED PER SECOND	CU. FT.	18.82	21.75	26.79	31.36	37.47	43.45	46.45	49.38
AIR MOVED PER SECOND	LBS.	1.377	1.590	1.967	2.292	2.730	3.159	3.381	3.588
WORK DONE IN MOVING AIR	FT. LBS.	30.76	63.45	82.50	132.75	220.30	339.5	414.10	493.9
WORK DONE IN MOVING AIR	H.P.	.0559	.1152	.1499	.2413	.4005	.6170	.7540	.8975
R.P.M. OF BLOWER		596	688	816	970	1166	1373	1478	1582
PERIPHERAL VEL. OF BLADES	FT./MIN.	2973	3429	4065	4835	5800	6840	7355	7877
R.P.M. OF MOTOR		355	405	488	576	680	805	860	924
AMMETER READING		5.50	6.00	7.25	9.50	13.45	19.58	23.50	28.20
VOLTMETER READING		111.58	111.66	111.00	111.42	111.16	110.75	110.66	110.58
INPUT WATTS		613.80	670.6	795.0	1059.5	1495.0	2680.0	2602.0	3125.0
MOTOR AND BELT EFFICIENCY	%	56.53	60.56	73.36	68.26	67.12	72.04	75.33	75.96
WORK SUPPLIED	FT. LBS.	15370	17960	26130	31980	44400	69150	86700	104800
WORK SUPPLIED	H.P.	.4655	.5440	.7915	.9690	1.346	2.096	2.626	3.175
EFFICIENCY OF BLOWER	%	12.00	21.19	18.95	24.91	29.79	29.43	28.68	28.24
CAPACITY COEFFICIENT		.476	.477	.495	.488	.486	.477	.474	.471
HORSE POWER COEFFICIENT		47.70	36.28	31.60	23.04	18.48	17.55	17.62	17.90

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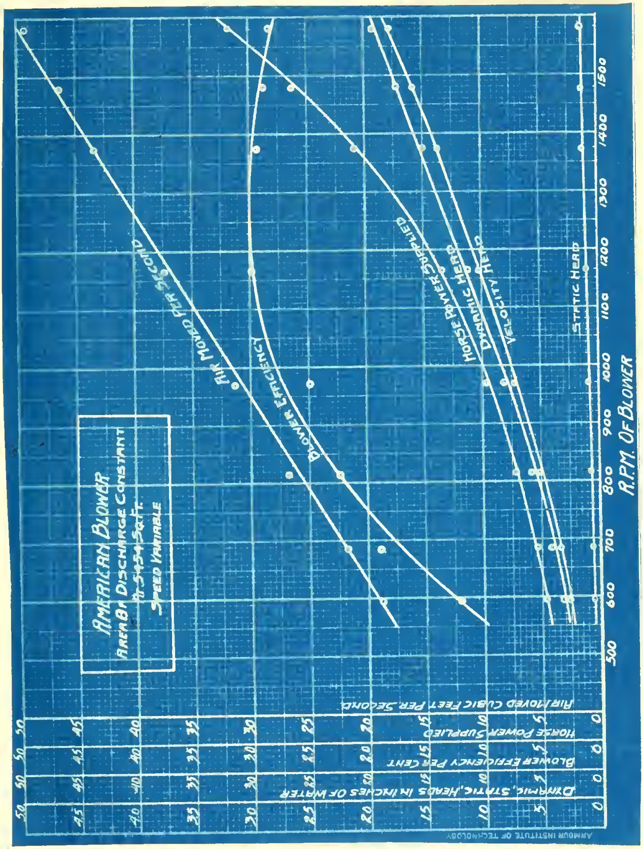
AMERICAN BLOWER
AREA BL. DISCHARGE CONSTANT
.5454 Sq. Ft.
SPEED VARIABLE
AIR MOVED PER SECOND
BLOWER EFFICIENCY
HORSE POWER SUPPLIED
DYNAMIC HEAD
VELOCITY HEAD
STATIC HEAD
500
600
700
800
900
1000
1100
1200
1300
1400
1500
R.P.M. OF BLOWER
AIR MOVED CUBIC FEET PER SECOND
HORSE POWER SUPPLIED
BLOWER EFFICIENCY PER CENT
DYNAMIC, STATIC, HEADS IN INCHES OF WATER
0
5
10
15
20
25
30
35
40
45
50
ARMOUR INSTITUTE OF TECHNOLOGY

FF

AMERICAN BLOWER DATA

APRIL 4, 1909 A.M.

BAROMETER 29.74"HG.

ZERO DRAFT GAUGE .330

No.	ORIFICE DIA INCHES	R.P.M.		GAUGES		MOTOR INPUT		TEMPERATURE	
		MOTOR	BLOWER	DRAFT	MAN.	VOLTS	AMPS	DUCT	ROOM
1	8	322	580	.440	.45	114.50	4.75	63.0	63.5
2	8	380	675	.478	.60	113.75	5.00	63.5	63.5
3	8	460	805	.540	.78	113.75	5.75	64.0	63.5
4	8	545	950	.620	1.15	113.50	7.00	66.0	64.0
5	8	652	1142	.740	1.65	113.25	9.25	66.0	64.0
6	8	765	1270	.875	2.15	113.25	13.00	66.5	64.5
7	8	835	1400	.970	2.55	113.25	16.00	66.5	64.5
8	8	895	1500	1.070	3.05	113.25	18.50	67.0	64.5
8	8	895	1500	1.075	3.00	113.25	18.40	67.0	64.5
7	8	840	1400	.975	2.60	113.25	16.00	67.0	65.0
6	8	775	1280	.880	2.20	113.50	13.25	67.0	65.0
5	8	655	1145	.745	1.65	113.25	9.25	67.5	65.0
4	8	545	955	.620	1.15	113.00	7.00	67.5	65.0
3	8	470	805	.540	.79	112.75	5.75	68.0	65.0
2	8	380	680	.480	.65	112.75	5.00	68.0	65.0
1	8	320	570	.440	.40	113.25	4.75	68.0	65.0
1	8	320	575	.435	.44	114.25	5.00	68.0	72.0
2	8	380	675	.475	.60	114.00	5.50	69.0	73.0
3	8	465	805	.550	.80	113.75	6.25	70.0	73.5
4	8	550	960	.615	1.15	113.75	6.75	71.0	74.0
5	8	658	1146	.747	1.66	113.25	9.00	71.0	74.0
6	8	770	1275	.872	2.20	113.25	12.75	71.0	74.0
7	8	832	1400	.965	2.60	113.00	15.50	71.0	74.0
8	8	897	1500	1.065	2.97	112.50	18.60	71.0	74.0

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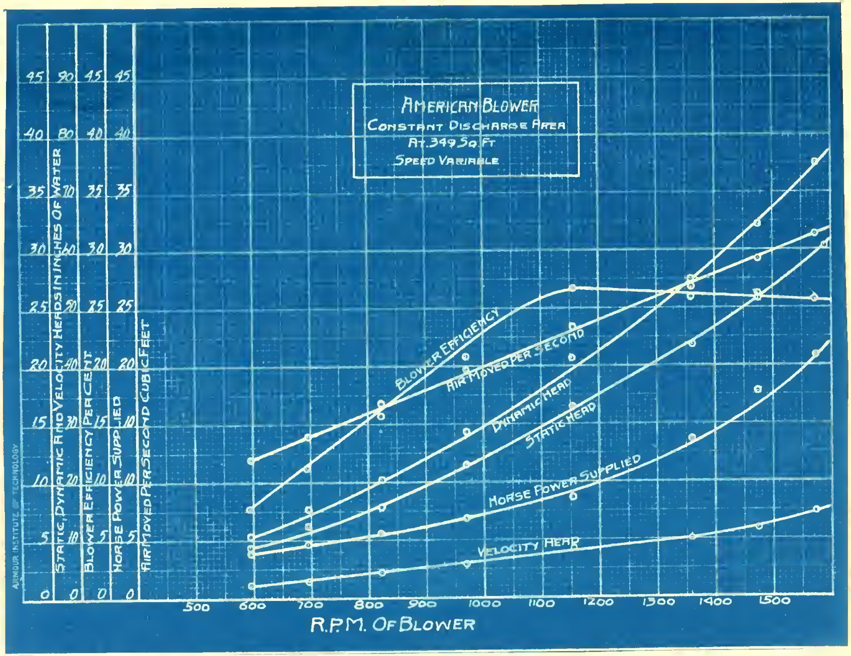
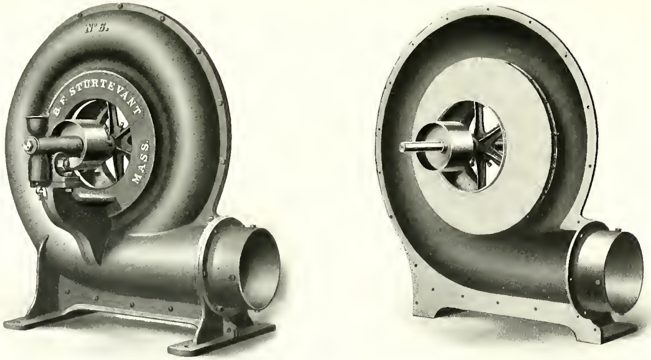

AMERICAN BLOWER
CONSTANT DISCHARGE AREA
AT .349 SQ. FT.
SPEED VARIABLE
BLOWER EFFICIENCY
AIR MOVED PER SECOND
DYNAMIC HEAD
STATIC HEAD
HORSE POWER SUPPLIED
VELOCITY HEAD
STATIC, DYNAMIC AND VELOCITY HEADS IN INCHES OF WATER
BLOWER EFFICIENCY PER CENT
HORSE POWER SUPPLIED
AIR MOVED PER SECOND CUBIC FEET
0 5 10 15 20 25 30 35 40 45
0 10 20 30 40 50 60 70 80 90
0 5 10 15 20 25 30 35 40 45
0 5 10 15 20 25 30 35 40 45
500 600 700 800 900 1000 1100 1200 1300 1400 1500
R.P.M. OF BLOWER
ARMOUR INSTITUTE OF TECHNOLOGY



STURTEVANT STEEL PRESSURE BLOWER

TEST OF STURTEVANT BLOWER

APRIL 15, 1909 A.M

BAROMETER 29.76" HG

ZERO DRAFT GAUGE .440

No.	ORIFICE DIA INCHES	R.P.M.		GAUGES		MOTOR INPUT		TEMP. IN
		MOTOR	BLOWER	DRAFT	MAN.	VOLTS	AMPS	DUCT
1	10	942	1350	2.100	5.75	110.75	64.00	81.5
2	8	995	1410	1.340	7.72	110.00	59.25	83.0
3	7	983	1425	.905	8.70	111.00	45.00	84.0
4	6	1020	1390	.655	8.75	112.00	38.00	83.0
5	5	1023	1420	.540	8.80	111.50	35.25	84.0
6	4	1040	1420	.475	8.85	112.00	29.50	84.0
7	3	1015	1405	.440	8.85	112.00	23.50	83.5
8	0							
8	0	1012	1390	.440	8.80	112.25	23.00	83.5
7	3	1070	1370	.475	8.75	112.00	27.75	83.5
6	4	940	1385	.535	8.75	111.00	28.25	83.0
5	5	975	1425	.670	8.80	110.50	37.50	83.0
4	6	963	1375	.885	8.80	110.25	41.75	84.0
3	7	942	1395	1.390	7.65	109.25	54.25	84.0
2	8	928	1350	1.950	6.28	108.50	62.00	84.0
1	10							
1	10	928	1350	1.950	6.28	108.50	62.00	65.5
2	8	970	1410	1.380	7.80	108.50	58.75	65.5
3	7	980	1430	.940	8.80	109.50	49.00	65.5
4	6	963	1415	.675	9.00	110.00	38.75	65.0
5	5	980	1416	.560	8.75	110.50	34.00	65.0
6	4	928	1380	.490	8.75	111.00	24.50	64.0
7	3	938	1400	.440	8.80	111.25	21.00	64.0
8	0							

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15/4

TEST OF STURTEVANT BLOWER

LOG SHEET

DATE 4-15-09-A.M.

NO OF BLADES 6

AREA DISCHARGE DUCT .5454 SQ. FT.

OUTSIDE DIA OF FAN WHEEL 31.0 INS.

DIA BLOWER PULLEY 7.875 INS.

WIDTH OF BLADES 9.25 INS.

DIA MOTOR PULLEY 12.0 INS.

EFFECTIVE INLET AREA .7830 SQ. FT.

MEAN VELOCITY RADIUS OF DUCT 4.10 INS.

DIA DISCHARGE DUCT 10.0 INS.

BAROMETER 29.76

AVERAGE RESULTS		1	2	3	4	5	6	7
DIA DISCHARGE ORIFICE	INS	0	3	4	5	6	7	8
AREA DISCHARGE ORIFICE	SQ. FT.	0	.0429	.0872	.1363	.1963	.2672	.3490
OUNCES OF PRESSURE		5.100	5.110	5.127	5.176	5.311	5.000	4.28
VELOCITY HEAD IN INS OF WATER		0	.035	.098	.223	.455	.930	1.66
VELOCITY HEAD IN FT OF AIR		0.	2.451	6.86	15.60	31.88	63.55	116.75
STATIC HEAD IN INS OF WATER		8.83	8.80	8.78	8.77	8.75	7.73	5.75
STATIC HEAD IN FT OF AIR		618.6	616.2	615.0	613.5	613.5	528.5	404.0
DYNAMIC HEAD IN INS OF WATER		8.83	8.835	8.878	8.993	9.205	8.66	7.41
DYNAMIC HEAD IN FT OF AIR		618.6	618.65	621.86	629.1	645.38	592.05	520.75
MEAN VEL. IN DUCT	FT./SEC.	0	12.52	20.97	31.60	45.12	63.58	86.50
TEMP. IN DUCT	°F	83.5	83.7	83.5	83.0	84.0	83.0	81.5
VALUE OF CONSTANT		70.00	70.00	70.00	69.95	70.10	70.20	70.37
WEIGHT 1 CU. FT. AIR IN DUCT	LBS.	.0744	.0744	.0744	.0744	.0743	.0742	.0741
AIR MOVED PER SEC.	CU. FT.	0	6.84	11.43	17.24	24.64	34.85	47.12
AIR MOVED PER SEC.	LBS.	0	.508	.850	1.2825	1.832	2.660	3.494
WORK DONE IN MOVING AIR	FT. LBS.	0	314.6	528.6	807.0	1182.0	1576.0	1889.0
WORK DONE IN MOVING AIR	H.P.	0	.5715	.9610	1.4670	2.1510	2.864	3.433
R.P.M. OF BLOWER		1475	1475	1480	1487	1478	1480	1430
PERIPHERAL VEL OF BLADES	FT./MIN.	11990	11980	12020	12080	12000	12020	11620
R.P.M. OF MOTOR		1030	1070	998	1011	990	970	958
AMMETER READING		23.25	28.62	31.75	37.75	43.37	56.50	64.0
VOLTMETER READING		112.12	112.0	111.25	111.25	110.62	108.87	110.75
INPUT WATTS		2610.0	3209.4	3539.0	4205.0	4794.0	6150.0	7095.0
MOTOR AND BELT EFFICIENCY	%	73.93	69.31	75.00	74.92	76.37	78.54	77.27
WORK SUPPLIED	FT. LBS.	85100	98250	11720	139100	161650	213800	242100
WORK SUPPLIED	H.P.	2.580	2.978	3.555	4.216	4.90	6.475	7.340
BLOWER EFFICIENCY	%	0	19.20	27.03	34.76	43.88	44.25	46.75
CAPACITY COEFFICIENT		0	.0156	.0268	.0403	.0580	.0820	.115
HORSE POWER COEFFICIENT		1.508	1.746	2.056	2.405	2.850	3.748	4.705

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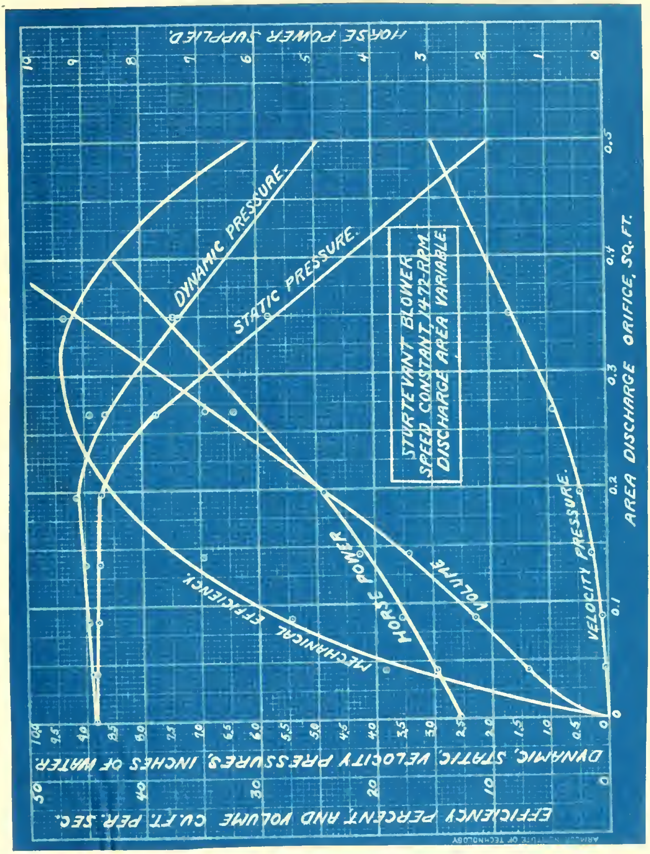
STURTEVANT BLOWER
SPEED CONSTANT, 1472 RPM.
DISCHARGE AREA VARIABLE.
DYNAMIC PRESSURE.
STATIC PRESSURE.
MECHANICAL EFFICIENCY.
HORSE POWER
VOLUME
VELOCITY PRESSURE.
AREA DISCHARGE ORIFICE, SQ.FT.
0
0.1
0.2
0.3
0.4
0.5
HORSE POWER SUPPLIED.
0
1
2
3
4
5
6
7
8
9
10
DYNAMIC, STATIC, VELOCITY PRESSURES, INCHES OF WATER.
0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
EFFICIENCY PERCENT AND VOLUME CU.FT. PER SEC.
0
10
20
30
40
50
ARMOUR INSTITUTE OF TECHNOLOGY

PP

TEST OF STURTEVANT BLOWER

APRIL 1909 A.M.

BAROMETER

ZERO DRAFT GAUGE .460

No.	ORIFICE DIA. INCHES	R.P.M.		GAUGES		MOTOR INPUT		TEMP. IN
		MOTOR	BLOWER	DRAFT	MAN.	VOLTS	AMPS	DUCT
1	0	710	1085	.460	5.25	112.50	10.00	62.2
2	3	710	1088	.480	5.20	112.50	11.75	60.0
3	4	710	1082	.516	5.15	112.00	13.25	60.0
4	5	708	1082	.595	5.15	111.75	15.25	59.0
5	6	704	1080	.736	4.78	111.50	18.00	59.2
6	7	705	1080	.990	4.45	111.25	21.00	59.8
7	8	705	1080	1.40	3.80	111.00	24.50	60.2
8	10	700	1060	2.760	.280	108.00	38.00	63.0
8	10	752	1108	3.360	.310	108.00	45.50	64.5
7	8	704	1080	1.630	3.82	111.00	24.50	60.0
6	7	704	1080	1.195	4.44	111.50	21.25	60.0
5	6	705	1080	.946	4.80	111.50	18.00	60.0
4	5	708	1082	.810	5.15	111.50	15.25	60.0
3	4	708	1080	.720	5.15	111.75	13.50	60.0
2	3	705	1082	.700	5.15	111.50	11.80	60.0
1	0	705	1080	.660	5.20	112.00	10.00	60.5
1	0	712	1090	.660	5.20	110.00	10.25	61.0
2	3	710	1085	.680	5.15	111.00	12.25	60.5
3	4	710	1085	.709	5.05	111.00	13.75	60.0
4	5	710	1085	.785	5.00	111.00	15.75	60.0
5	6	703	1080	.923	4.85	110.00	18.00	59.5
6	7	708	1082	1.175	4.50	110.50	21.25	61.0
7	8	700	1075	1.560	3.80	110.00	25.00	61.0
8	10	732	1110	3.10	.23	108.00	43.75	63.0

J F

TEST OF STURTEVANT BLOWER

LOG SHEET

DATE 4-16-09 A.M.

NO. OF BLADES 6

AREA DISCHARGE DUCT .5454 SQ. FT.

OUTSIDE DIA OF FAN WHEEL 31.0 INS.

DIA BLOWER PULLEY 7.875 INS.

WIDTH OF BLADES 9.25 INS.

DIA MOTOR PULLEY 12.0 INS.

EFFECTIVE INLET AREA .7830 SQ. FT.

MEAN VEL. RADIUS OF DUCT 4.10 INS.

DIA DISCHARGE DUCT 10.0 INS.

BAROMETER 29.56

AVERAGE RESULTS		1	2	3	4	5	6	7	8
DIA. DISCHARGE ORIFICE	INS.	0	3	4	5	6	7	8	10
AREA DISCHARGE ORIFICE	SQ. FT.	0	.0429	.0872	.1363	.1963	.2672	.3490	.5454
OUNCES OF PRESSURE		3.021	3.000	2.994	3.022	2.939	2.880	2.740	1.672
VELOCITY HEAD IN INS OF WATER		0	.027	.058	.137	.275	.527	.937	2.60
VELOCITY HEAD IN FT. OF AIR		0	1.839	3.95	9.32	18.72	35.93	64.05	180.2
STATIC HEAD IN INS OF WATER		5.23	5.17	5.12	5.10	4.81	4.46	3.81	.295
STATIC HEAD IN FT. OF AIR		356.7	352.0	348.5	347.0	327.6	309.0	260.4	20.46
DYNAMIC HEAD IN INS OF WATER		5.23	5.197	5.178	5.237	5.085	4.987	4.747	2.895
DYNAMIC HEAD IN FT OF AIR		356.7	353.84	352.45	356.32	339.93	324.45	324.45	200.66
MEAN VEL. IN DUCT	FT/SEC	0	10.85	15.78	24.44	34.66	48.00	64.10	107.40
TEMP IN DUCT	°F	61.2	60.3	60.0	59.7	59.6	60.3	60.4	63.7
VALUE OF CONSTANT		68.21	68.10	68.07	68.05	68.07	68.15	68.37	69.40
WEIGHT 1 CU. FT. AIR IN DUCT	LBS.	.07638	.07641	.07650	.07655	.07655	.07638	.0763	.07515
AIR MOVED PER SEC	CU. FT.	0	5.915	8.610	13.33	18.90	26.20	34.96	58.60
AIR MOVED PER SEC	LBS.	0	.4516	.6588	1.021	1.448	1.799	2.668	4.410
WORK DONE IN MOVING AIR	FT. LBS.	0	160.00	232.2	363.9	501.2	679.8	866.10	886.0
WORK DONE IN MOVING AIR	H.P.	0	.2907	.4222	.6616	.9112	1.2350	1.573	1.611
R.P.M. OF BLOWER		1099	1099	1096	1097	1094	1095	1092	1096
PERIPHERAL VEL OF BLADES	FT/MIN	8925	8925	8900	8908	8895	8898	8875	8900
R.P.M. OF MOTOR		730	729	730	730	725	727	724	745
AMMETER READING		10.08	11.93	13.50	15.42	18.00	21.17	24.70	41.75
VOLTMETER READING		111.50	111.70	111.58	111.42	111.00	111.08	110.70	108.0
INPUT WATTS		1120.50	1331.0	1505.0	1720.40	2000.0	2236.0	2739.0	4505.0
MOTOR AND BELT EFFICIENCY	%	62.56	65.37	66.19	67.95	70.26	71.45	72.79	73.34
WORK SUPPLIED	FT. LBS.	31080	38520	44060	51750	62120	74380	88100	146200
WORK SUPPLIED	H.P.	.9420	1.1670	1.336	1.5675	1.883	2.253	2.668	4.436
BLOWER EFFICIENCY	%	0	24.90	31.61	42.21	48.39	54.85	58.95	36.36
CAPACITY COEFFICIENT		0	.0187	.0273	.0424	.0600	.0831	.1110	.1860
HORSE POWER COEFFICIENT		1.335	1.650	1.905	2.228	2.700	3.219	3.840	6.330

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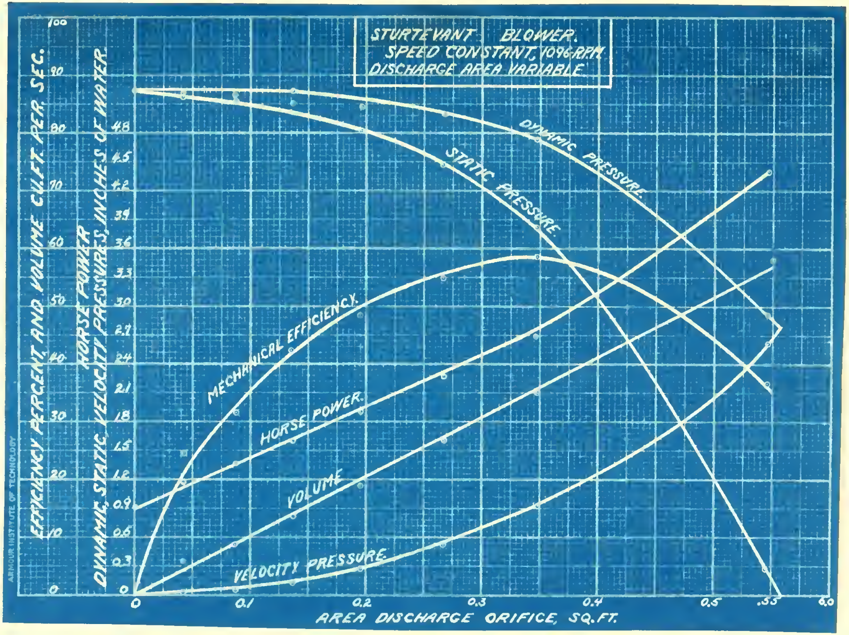
STURTEVANT BLOWER.
SPEED CONSTANT, 1096 R.P.M.
DISCHARGE AREA VARIABLE
DYNAMIC PRESSURE.
STATIC PRESSURE.
MECHANICAL EFFICIENCY.
HORSE POWER.
VOLUME
VELOCITY PRESSURE.
EFFICIENCY PERCENT AND VOLUME CU.FT. PER SEC.
HORSE POWER
DYNAMIC, STATIC, VELOCITY PRESSURES, INCHES OF WATER
100
90
80
70
60
50
40
30
20
10
0
4.8
4.5
4.2
3.9
3.6
3.3
3.0
2.7
2.4
2.1
1.8
1.5
1.2
0.9
0.6
0.3
0
0
0.1
0.2
0.3
0.4
0.5
.55
6.0
AREA DISCHARGE ORIFICE, SQ.FT.
ARMOUR INSTITUTE OF TECHNOLOGY

STURTEVANT BLOWER DATA

APRIL 15-16, 1909 A.M

BAROMETER

ZERO DRAFT GAUGE .045

No.	ORIFICE DIA INCHES	R.P.M.		GAUGES		MOTOR INPUT		TEMP. IN
		MOTOR	BLOWER	DRAFT	MAN.	VOLTS	AMPS	DUCT
1	10	340	540	1.185	.05	111.75	7.75	71.0
2	10	440	690	1.650	.06	109.25	11.75	72.0
3	10	532	828	2.120	.10	114.40	17.50	74.0
4	10	642	992	2.860	.15	113.25	28.70	75.0
5	10	732	1110	3.550	.23	108.00	43.75	63.0
6	10	780	1120	3.850	.37	107.50	55.00	64.0
7	10	858	1150	4.100	.37	106.50	71.00	64.5
8	10	870	1175	4.160	.37	106.50	75.00	63.0
8	10	870	1175	4.160	.37	112.00	75.00	74.5
7	10	858	1150	4.100	.37	112.25	71.00	75.0
6	10	780	1120	3.850	.37	112.50	55.00	75.0
5	10	732	1110	3.550	.25	112.50	43.50	75.0
4	10	642	992	2.87	.155	112.75	29.25	75.0
3	10	545	842	2.16	.100	113.25	18.50	75.5
2	10	460	710	1.705	.070	113.50	12.50	75.5
1	10	342	545	1.205	.040	112.75	8.0	74.0
1	10	345	560	1.210	.050	114.00	8.00	74.2
2	10	455	705	1.690	.065	114.00	12.00	74.5
3	10	340	835	2.150	.105	113.50	17.75	75.0
4	10	658	1005	2.930	.160	112.75	30.50	76.0
5	10	730	1110	3.600	.230	113.00	44.00	75.5
6	10	780	1120	3.850	.370	113.00	55.00	75.5
7	10	860	1150	4.100	.370	113.00	71.00	75.0
8	10	870	1175	4.160	.370	113.00	75.00	75.0

JJ

TEST OF STURTEVANT BLOWER

LOG SHEET

DATE 4-15-09-A.M.

NO OF BLADES 6

AREA DISCHARGE DUCT 5454 SQ. FT.

OUTSIDE DIA OF FAN WHEEL 31.0 INS.

DIA BLOWER PULLEY 7.875 INS.

WIDTH OF BLADES 9.25 INS.

DIA MOTOR PULLEY 12.0 INS.

EFFECTIVE INLET AREA .7830 SQ. FT.

MEAN VEL RADIUS OF DUCT 4.10 INS.

DIA. DISCHARGE DUCT 10.0 INS.

BAROMETER 29.56

AVERAGE RESULTS		1	2	3	4	5	6	7
DIA DISCHAGE ORIFICE	INS	10	10	10	10	10	10	10
AREA DISCHARGE ORIFICE	SQ. FT.	.5454	.5454	.5454	.5454	.5454	.5454	.5454
OUNCES OF PRESSURE		.460	748	1.036	1.499	1.922	2.177	2.345
VELOCITY HEAD IN INS. OF WATER		.75	1.232	1.69	2.44	3.10	3.40	3.68
VELOCITY HEAD IN FT OF AIR		52.70	86.65	118.9	172.0	214.9	236.1	255.4
STATIC HEAD IN INS OF WATER		.047	.065	.102	.155	.230	.370	.380
STATIC HEAD IN FT OF AIR		3.30	4.571	7.30	10.92	15.94	25.70	26.36
DYNAMIC HEAD IN INS OF WATER		.797	1.297	1.792	2.595	3.33	3.77	4.06
DYNAMIC HEAD IN FT. OF AIR		56.00	91.221	126.2	182.92	230.84	261.8	281.76
MEAN VEL. IN DUCT	FT/SEC	58.10	74.50	86.90	105.0	117.2	123.0	127.7
TEMP. IN DUCT	°F	73.1	74.0	74.8	75.0	63.0	64.0	63.7
VALUE OF CONSTANT		70.20	70.35	70.41	70.45	69.36	69.45	69.40
WEIGHT OF 1 CU. FT. AIR IN DUCT		.07422	.07410	.07400	.07395	.07522	.07512	.07515
AIR MOVED PER SEC.	CU. FT.	31.70	40.61	47.40	57.35	63.97	67.11	69.65
AIR MOVED PER SEC.	LBS.	2.353	3.013	3.507	4.24	4.812	5.045	5.239
WORK DONE IN MOVING AIR	FT. LBS.	131.80	274.7	442.8	775.5	1111.00	1320.0	1475.0
WORK DONE IN MOVING AIR	H.P.	.2397	.4995	.8050	1.410	2.020	2.40	2.684
R.P.M. OF BLOWER		571	722	852	1010	1123	1209	1251
PERIPHERAL VEL OF BLADES	FT./MIN	4645	5865	6920	9020	9135	9812	10170
R.P.M. OF MOTOR		370	480	564	667	752	799	882
AMMETER READING		7.92	12.08	17.92	29.50	43.75	55.00	73.0
VOLTMETER READING		113.17	112.25	113.72	112.92	108.00	107.50	106.50
INPUT WATTS		897.4	1260.0	2039.4	3319.55	4725.0	5917.5	7785.5
MOTOR AND BELT EFFICIENCY	%	59.6	72.01	75.90	73.99	76.34	76.26	73.64
WORK SUPPLIED	FT. LBS.	23670	43240	68480	104050	159500	199700	253600
WORK SUPPLIED	H.P.	.7170	1.310	2.0740	3.305	4.838	6.050	7.688
EFFICIENCY OF BLOWER	%	33.41	38.10	38.80	42.65	41.77	39.67	34.90
CAPACITY COEFFICIENT		.193	.196	.193	.197	.198	.193	.193
HORSE POWER COEFFICIENT		7.210	6.515	6.285	6.00	6.395	6.288	7.350

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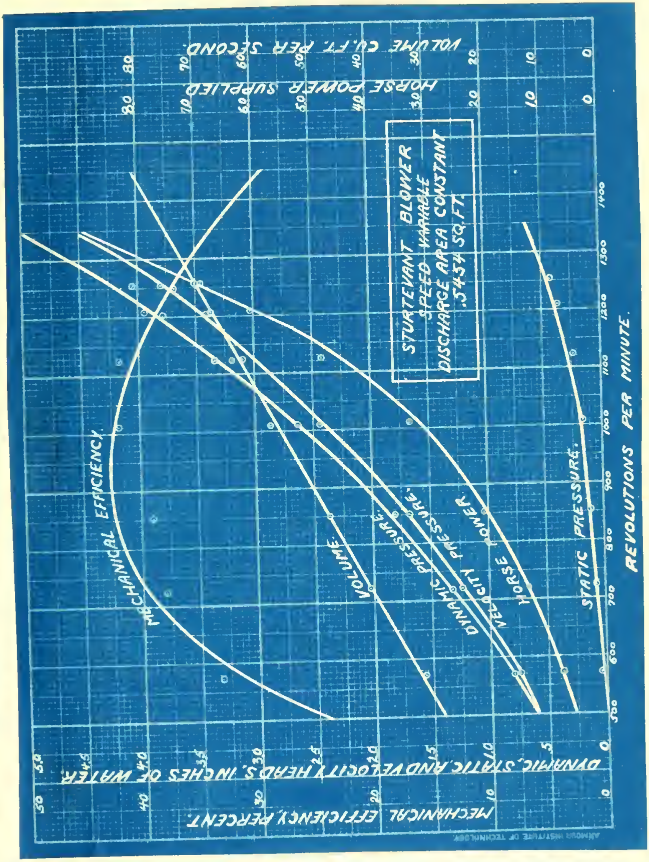
STURTEVANT BLOWER
SPEED VARIABLE
DISCHARGE AREA CONSTANT
.5434 SQ. FT.
REVOLUTIONS PER MINUTE
500
600
700
800
900
1000
1100
1200
1300
1400
DYNAMIC, STATIC AND VELOCITY HEADS, INCHES OF WATER.
0
.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
MECHANICAL EFFICIENCY, PERCENT.
0
10
20
30
40
50
HORSE POWER SUPPLIED
0
10
20
30
40
50
60
70
80
VOLUME CU. FT. PER SECOND.
0
10
20
30
40
50
60
70
80
MECHANICAL EFFICIENCY.
VOLUME.
PRESSURE.
DYNAMIC PRESSURE.
VELOCITY PRESSURE.
HORSE POWER.
STATIC PRESSURE.
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RR

STURTEVANT BLOWER DATA

APRIL 15, 1909 AM

BAROMETER 29.76" HG

ZERO DRAFT GAUGE = .440

NO	ORIFICE DIA. INCHES	R.P.M.		GAUGES		MOTOR INPUT		TEMP. IN
		MOTOR	BLOWER	DRAFT	MAN	VOLTS	AMPS	DUCT
1	8	375	590	.728	.92	113.00	6.75	74.0
2	8	455	710	.840	1.60	113.00	9.00	75.0
3	8	540	840	1.000	2.15	112.25	12.80	75.5
4	8	600	925	1.120	2.60	112.00	16.00	77.0
5	8	722	1110	1.390	3.65	111.50	26.50	78.5
6	8	872	1250	1.840	5.22	111.75	47.25	80.5
7	8	923	1430	1.985	5.77	111.00	58.50	78.0
8	8							
8								
7	8	925	1430	1.990	5.75	111.25	58.75	79.5
6	8	870	1250	1.845	5.20	111.50	47.25	79.0
5	8	725	1115	1.385	3.70	111.50	26.75	79.0
4	8	600	930	1.125	2.60	112.25	16.25	78.5
3	8	545	850	1.050	2.10	112.25	12.75	77.5
2	8	460	715	.850	1.60	112.00	9.00	77.0
1	8	375	595	.730	.90	112.50	6.75	76.0
1	8	372	590	.744	1.05	113.70	6.50	74.5
2	8	452	705	.860	1.50	114.40	8.65	76.0
3	8	542	845	1.044	2.12	113.00	12.25	77.5
4	8	600	930	1.160	2.55	113.00	16.00	78.0
5	8	718	1105	1.400	3.65	112.75	25.75	78.5
6	8	862	1235	1.890	5.10	111.50	45.50	80.0
7	8	942	1350	2.10	5.70	110.75	64.00	81.5
8								

KK

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TEST OF STURTEVANT BLOWER

LOG SHEET

DATE 4-15-09-A.M.

NO OF BLADES 6

OUTSIDE DIA OF FAN WHEEL 31.0 INS.

WIDTH OF BLADES 9.25 INS.

EFFECTIVE INLET AREA .7830 SQ. FT.

DIA DISCHARGE DUCT 10.0 INS.

AREA DISCHARGE DUCT .5454 SQ. FT.

DIA BLOWER PULLEY 7.875 INS.

DIA MOTOR PULL 12.0 INS.

MEAN VEL. RADIUS OF DUCT 4.10 INS.

BAROMETER 29.76

AVERAGE RESULTS		1	2	3	4	5	6	7
DIA DISCHARGE ORIFICE	INS	8	8	8	8	8	8	8
AREA DISCHARGE ORIFICE	SQ. FT	.349	.349	.349	.349	.349	.349	.349
OUNCES OF PRESSURE		.725	1.143	1.566	1.890	2.670	3.800	4.23
VELOCITY HEAD IN INS OF WATER		.294	.410	.590	.695	.952	1.418	1.585
VELOCITY HEAD IN FT OF AIR		20.67	28.85	41.53	48.89	66.95	99.50	111.15
STATIC HEAD IN INS OF WATER		.96	1.57	2.12	2.58	3.67	5.17	5.74
STATIC HEAD IN FT OF AIR		67.50	110.35	149.00	181.40	258.0	362.6	402.5
DYNAMIC HEAD IN INS OF WATER		1.254	1.980	2.711	3.275	4.622	6.588	7.325
DYNAMIC HEAD IN FT OF AIR		88.17	139.2	190.53	230.39	329.95	462.10	513.65
MEAN VELOCITY IN DUCT	FT/SEC	36.12	43.00	51.57	56.0	65.52	79.85	84.95
TEMP. IN DUCT	°F	74.8	76.0	76.8	77.8	78.7	79.8	79.7
VALUE OF CONSTANT		70.28	70.38	70.30	70.30	70.30	70.12	70.10
WEIGHT 1 CU. FT AIR IN DUCT	LBS	.07439	.07407	.0740	.07418	.0741	.07425	.07432
AIR MOVED PER SEC.	CU. FT.	19.70	23.45	28.14	30.54	35.78	43.51	46.03
AIR MOVED PER SEC	LBS.	1.466	1.738	2.084	2.265	2.654	3.231	3.422
WORK DONE IN MOVING AIR	FT LBS	129.25	241.8	397.4	521.5	862.1	1492.5	1757.5
WORK DONE IN MOVING AIR	H.P.	.2352	.4397	.7221	.9480	1.5665	2.714	3.193
R.P.M. OF BLOWER		616	730	862	944	1126	1330	1466
PERIPHERAL VEL OF BLADES	FT/MIN	5000	5935	7000	7665	9150	10800	11900
R.P.M. OF MOTOR		400	481	567	622	745	885	950
AMMETER READING		6.67	8.88	12.60	16.08	26.33	46.67	60.42
VOLTMETER READING		113.07	113.13	11242	112.42	111.92	111.58	111.00
INPUT WATTS		755.90	1100.40	1417.4	1806.0	2940.6	5211.60	6705.0
MOTOR-BELT EFFICIENCY	%	62.60	67.58	73.00	69.57	72.75	76.88	79.38
WORK SUPPLIED	FT LBS	20880	30020	45800	55700	94900	177100	200100
WORK SUPPLIED	H.P.	.6328	.9100	1.388	1.688	2.875	5.362	6.062
EFFICIENCY OF BLOWER	%	37.16	48.38	52.20	56.20	54.45	50.63	52.62
CAPACITY COEFFICIENT		.111	.112	.113	.112	.111	.114	.109
HORSE POWER COEFFICIENT		5.070	4.38	4.060	3.764	3.785	4.28	3.613

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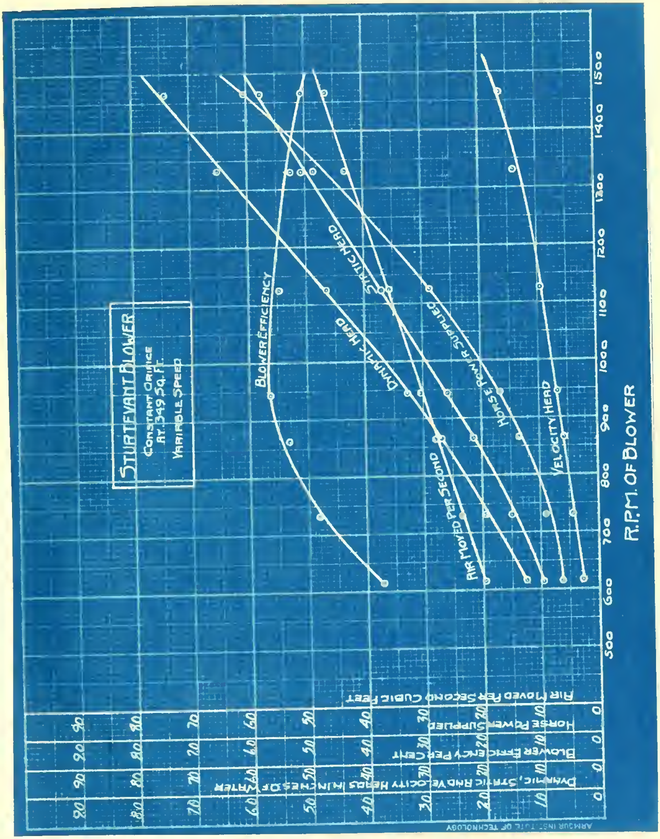
STURTEVANT BLOWER
CONSTANT ORIFICE
AR. .349 SQ. FT.
VARIABLE SPEED
BLOWER EFFICIENCY
STATIC HEAD
DYNAMIC HEAD
HORSE POWER SUPPLIED
AIR MOVED PER SECOND
VELOCITY HEAD
R.P.M. OF BLOWER
500
600
700
800
900
1000
1100
1200
1300
1400
1500
AIR MOVED PER SECOND CUBIC FEET
HORSE POWER SUPPLIED
BLOWER EFFICIENCY PER CENT
DYNAMIC, STATIC AND VELOCITY HEADS IN INCHES OF WATER
0
10
20
30
40
50
60
70
80
90
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
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COMPARATIVE BLOWER RESULTS.

SHOWING ACTIONS OF THE DIFFERENT BLOWERS WHEN RUNNING UNDER SIMILAR CONDITIONS.

CONSTANT DISCHARGE ORIFICE AT .5454 SQ. FT.

NO	BLOWER	R.P.M.	CUBIC FEET PER MIN.	CUBIC FEET PER REV.	DYNAMIC HD. INCHES H_2O	$U^2 \div G$ INCHES H_2O	OUNCES PER SQ. IN.	EQUIVALENT ORIFICE SQ. FT.
1	B	800	1757	2.195	.753	2.64	.435	.7740
	A	800	1530	1.912	.525	1.97	.3034	.8070
	S	800	2686	3.356	1.650	525	.953	.8000
2	B	1000	2178	2.178	1.203	4.125	.695	.7600
	A	1000	1898	1.898	.842	3.075	.4865	.7910
	S	1000	3342	3.342	2.575	8.200	1.487	.7970
3	B	1200	2588	2.156	1.670	5.940	.965	.7660
	A	1200	2275	1.895	1.200	4.429	.694	.7950
	S	1200	4005	3.339	3.830	11.805	2.214	.7840

CONSTANT DISCHARGE ORIFICE AT .3490 SQ. FT.

NO	BLOWER	R.P.M.	CUBIC FEET PER MIN.	CUBIC FEET PER REV.	DYNAMIC HD. INCHES H_2O	$U^2 \div G$ INCHES H_2O	OUNCES PER SQ. IN.	EQUIVALENT ORIFICE SQ. FT.
1	B	700	936	1.337	.95	2.024	.549	.3674
	A	700	840	1.200	.725	1.507	.419	.3770
	S	700	1332	1.902	1.855	4.014	1.071	.3745
2	B	900	1348	1.498	1.590	3.340	.919	.4090
	A	900	1080	1.200	1.200	2.492	.694	.3770
	S	900	1720	1.911	2.920	6.640	1.687	.3850
3	B	1400	1857	1.327	3.780	8.090	2.184	.3657
	A	1400	1678	1.197	2.900	6.030	1.676	.3770
	S	1400	2695	1.924	7.000	16.070	4.096	.3890

NAME	BUFFALO	AMERICAN	STURTEVANT
OUTSIDE DIA. OF FAN WHEEL FEET	1.834	1.584	2.585
AVERAGE HORSE POWER COEFFICIENT 8" ORIFICE	12.60	11.950	4.160
AVERAGE HORSE POWER COEFFICIENT 10" ORIFICE	20.98	17.32	6.54
AVERAGE CAPACITY COEFFICIENT 8" ORIFICE	.214	.281	.112
AVERAGE CAPACITY COEFFICIENT 10" ORIFICE	.365	.478	.194
ORIFICE OF PASSAGE 8" ORIFICE SQ. FT.	1.155	.596	.935
ORIFICE OF PASSAGE 10" ORIFICE SQ. FT.	.805	.636	1.053
EFFECTIVE INLET AREA SQUARE FEET	1.250	.885	.783

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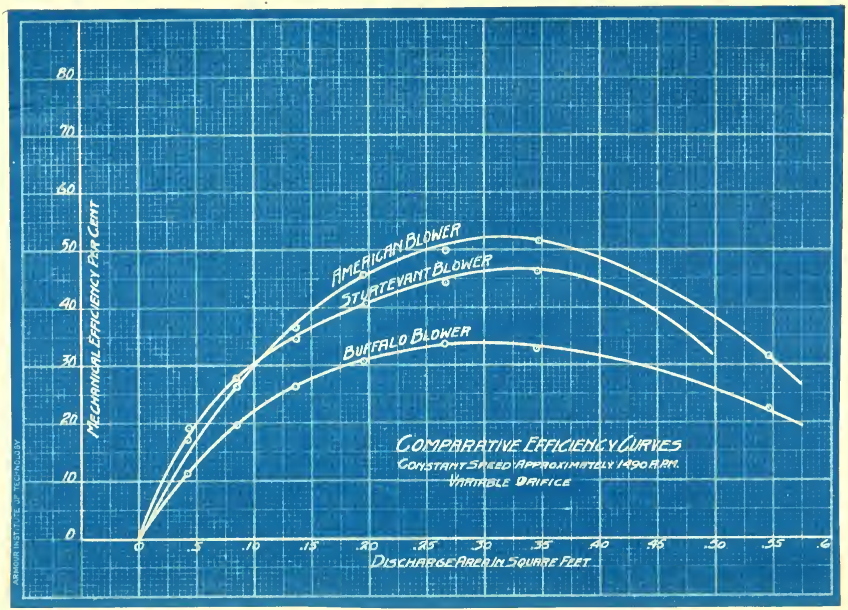
COMPARATIVE EFFICIENCY CURVES
CONSTANT SPEED APPROXIMATELY 1490 R.P.M.
VARIABLE ORIFICE
AMERICAN BLOWER
STURTEVANT BLOWER
BUFFALO BLOWER
MECHANICAL EFFICIENCY PER CENT
0
10
20
30
40
50
60
70
80
DISCHARGE AREA IN SQUARE FEET
0
.5
.10
.15
.20
.25
.30
.35
.40
.45
.50
.55
.6
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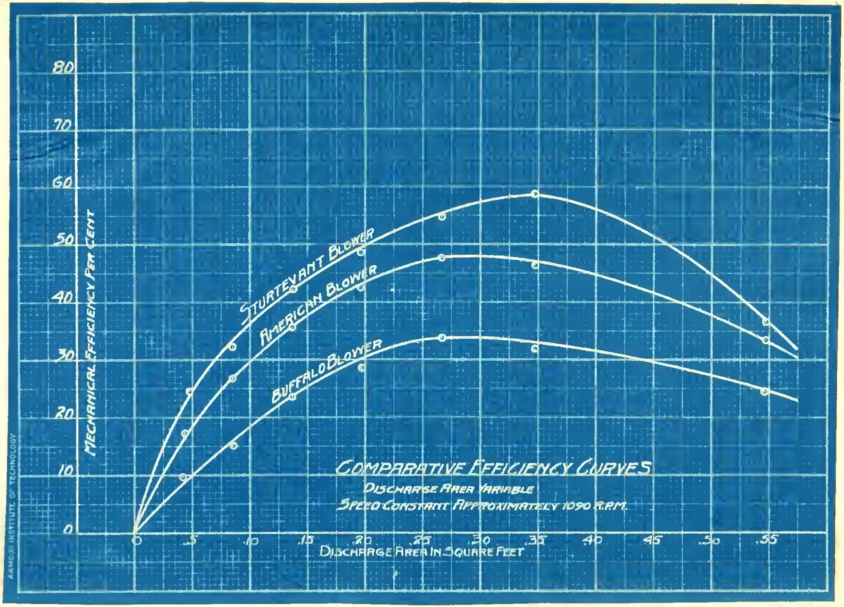
COMPARATIVE EFFICIENCY CURVES
DISCHARGE AREA VARIABLE
SPEED CONSTANT APPROXIMATELY 1090 R.P.M.
STURTEVANT BLOWER
AMERICAN BLOWER
BUFFALO BLOWER
MECHANICAL EFFICIENCY PER CENT
0
10
20
30
40
50
60
70
80
DISCHARGE AREA IN SQUARE FEET
0
.5
.10
.15
.20
.25
.30
.35
.40
.45
.50
.55
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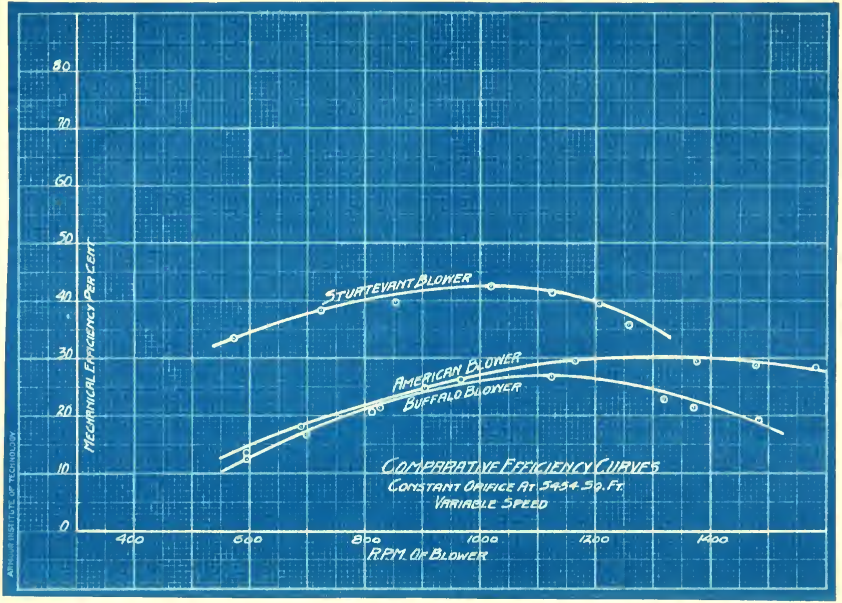
Comparative Efficiency Curves
Constant Orifice At 5454 Sq. Ft.
Variable Speed
Sturtevant Blower
American Blower
Buffalo Blower
Mechanical Efficiency Per Cent
R.P.M. Of Blower
0
10
20
30
40
50
60
70
80
400
600
800
1000
1200
1400
Armour Institute of Technology

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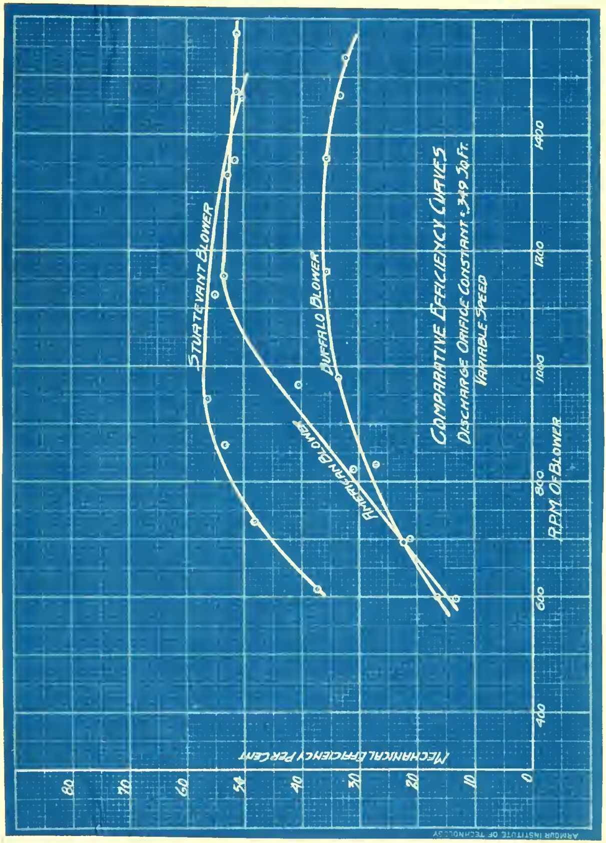
COMPARATIVE EFFICIENCY CURVES
DISCHARGE ORIFICE CONSTANT = 3.49 SQ. FT.
VARIABLE SPEED
STURTEVANT BLOWER
BUFFALO BLOWER
AMERICAN BLOWER
MECHANICAL EFFICIENCY PER CENT
R.P.M. OF BLOWER
0
10
20
30
40
50
60
70
80
400
600
800
1000
1200
1400
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